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DISEASES CAUSED BY BACTERIA AND FUNGI.

DIERNHOFER, K. (1932). Ueber das Vorkommen β-haemolytischer Streptokokken im Kuheuter und ihren Einfluss auf dessen Zustand. [**On the Occurrence of β Haemolytic Streptococci in the Cow's Udder and their Influence on its Condition**].—*Zschr. Infektkr. Haust.* **42.** 67-80. [14 refs.]

An examination was made of 147 strains of mastitis streptococci from an equal number of quarters of 76 cows on 22 farms. The strains were obtained from the deposit of carefully taken samples, in most cases by streaking on glucose blood agar. One or more colonies from each were further examined by surface culture on plain agar and saccharose-brom-cresol-purple agar, by deep culture in ordinary blood agar, and by culture in plain broth, hippurate broth and litmus milk. The strains are arranged as follows. Non-haemolytic mastitis streptococci (" anaemolytische Galtstreptokokken "), 118 strains ; 113 of these were regarded as typical *Str. agalactiae*, whilst five were distinguished because they produced smooth-edged surface colonies and a turbidity in broth. Haemolytic mastitis streptococci (" haemolytische Galtstreptokokken "), 28 strains ; all produced β zones in ordinary 5 per cent. blood agar and had the general characters of *Str. agalactiae* but, in contrast to the greater part of the non-haemolytic strains, produced smooth colonies on agar and some turbidity in broth. One strain was a typical *Str. pyogenes*.

The author attributes the failure of continental workers to detect β haemolytic streptococci in mastitis secretion earlier to the fact that surface culture has usually been used and that some addition of sugar has often been made. Further to the fact that the typical mastitis strain has been regarded as productive of a rough-edged surface colony and a flocculent deposit with a clear supernatant in broth media.

He was able, however, to find no distinction between the pathogenic characters of haemolytic and non-haemolytic mastitis streptococci and concludes that differentiation is unnecessary. He favours the use of his own method, surface culture on glucose or saccharose blood agar, as the most useful means of examining mastitis secretion. On this medium *Str. pyogenes* produces β haemolytic zones, whilst both forms of mastitis streptococci are non-haemolytic.

—A. W. STABLEFORTH.

SCHMIDT, F. (1933). Mastitisstreptokokken und Kurzwellenbestrahlung. [**Mastitis Streptococci and Short Wave Irradiation**].—*Deuts. tierärztl. Wschr.* **41.** 69-71. 3 tables. [6 refs.]

The author shows that streptococci, in the same way as staphylococci, are sensitive to the action of electric currents of short wave length. An experiment in which milk containing large numbers of streptococci was exposed to currents of different wave lengths showed that the maximum bactericidal action was obtained with a wave length of 3·6 mm. Even with this current there appeared to be a considerable production of heat so that it seems doubtful whether the bactericidal action was directly due to the influence of the electric current on the bacteria. The conductivity of milk could be greatly increased by the addition of 3 per cent. boric acid.—S. J. EDWARDS.

STABLEFORTH, A. W. (1932). **Studies on Bovine Mastitis. VII.—The Serological Characters of Mastitis Streptococci.**—*J. Comp. Path. & Therap.* **45.** 185-211. 5 tables. [29 refs.]

A study has been made of the serological characters of 160 strains of streptococci from different quarters of 151 animals. Of these strains, 110 were from the secretion of severe cases. The streptococci belonged to the groups I, II and III, into which it has already been shown that streptococci from cases of bovine mastitis can be arranged on cultural and biochemical grounds. [*J. Comp. Path. & Therap.* **42.** 213, **44.** 114 and **45.** 43].

It is shown in this report that each of the groups can be further divided by serological methods. The number of strains of each group examined and the serological types recognized were as follows :—

GROUP I.—91 strains, which in general characters corresponded with the group of streptococci which are the most common cause of chronic bovine mastitis (the so-called *Str. mastitidis* or *Str. agalactiae*) : 61 strains were of type Ia, 6 of type Ib and 24 of type Ic.

GROUP II.—29 strains : 12 strains of type IIa, 10 of type IIb and 4 of type IIc. Three strains had antigens belonging to each of these types.

GROUP III.—40 strains : 5 strains were of type IIIa, one of type IIIb and 7 of type IIIc. Two strains gave a partial reaction with sera of both types a and b. 25 strains gave a negative result with all sera.

Of the 91 strains in Group I, 55 were haemolytic (β) and 36 non-haemolytic in ox-blood agar plates. Haemolytic and non-haemolytic (α or γ) strains were present in types a and b of this group and were found to be alike by direct tests and by absorption with graded amounts of organisms. All strains of type c were haemolytic. Groups II and III contained only non-haemolytic strains. Except in regard to haemolysis, strains of the same serological type were alike biochemically. Strains which behaved similarly in biochemical tests, i.e. strains of the same group, did not necessarily belong to the same type. Strains of different biochemical groups were entirely distinct serologically. In certain cases types within the same group showed a minor degree of likeness due to subsidiary antigens.

The methods used were :—precipitation at 50° to 55°C., using extracts prepared with hot M/20 hydrochloric acid in saline ; agglutination, using a rapid naked-eye slide technique at room temperature and the corresponding absorption tests. Immune sera were rendered type-specific by preliminary absorption to remove subsidiary antibodies. Tests for specific absorption were carried out with one to two minimal absorptive doses as judged from the serum strain or with graded doses.

The precipitation method was applicable to all types of streptococci except

those of group III, which are apparently deficient in the type-specific protein required for this test. The slide agglutination method, which was carried out with thick suspensions on ordinary slides on which six cells of standard size had been made by means of a stencil and grease pencil, gave easily read and reproducible results, and by the methods described, tests for both direct agglutination and for absorption of agglutinins were carried out quickly. Suspensions which were not sufficiently stable for tube agglutination tests at higher temperatures were in general satisfactory for slide tests. A few strains always gave granular suspensions and could only be dealt with by agglutinin-absorption or by precipitation. In groups I and II the results of precipitation and agglutination were usually parallel.

The types described are serologically distinct from strains of *Str. pyogenes*, *Str. lactis* and *Str. cremoris*.—A. W. STABLEFORTH.

I. HADLEY, F. B., & FROST, W. D. (1933). **Experimental Bovine Mastitis.**—*Cornell Vet.* **23.** 40-46. [3 refs.]

II. HADLEY, F. B., & FROST, W. D. (1933). **A Six-Month Study of Bovine Mastitis in Herd of 100 Cows.**—*J. Amer. Vet. Med. Ass.* **82.** 345-360. 3 tables.

I. The authors record the results of experiments in which strains of different streptococcus types were inoculated into the non-infected udders of milking cows. The method of inoculation was to twirl in the opening of the teat a swab of cotton wool moistened with a culture of the organism grown on a blood agar slant. This procedure was adopted in order to avoid the possibility of setting up changes in the udder due to the agent used for suspending the bacteria. After exposure in this way, the cows were examined clinically and the changes occurring in the udders and milk determined by stable and laboratory tests.

Three strains of *Str. epidemicus* of human, bovine and equine origin respectively proved to be the most pathogenic, in each case setting up an acute mastitis with marked constitutional disturbance and cessation of milk yield.

A strain of *Str. mastitidis*, a β haemolytic bovine type and one of *Str. mitis*, a non-haemolytic variety corresponding to *Str. agalactiae*, produced, after preliminary acute changes, a chronic disease with persistence of the organism in the infected quarter. Another strain of *Str. mitis* set up a severe mastitis with complete destruction of the infected quarter.

Other streptococci tested were *Str. infrequens*, a β haemolytic type isolated from the throat of a milker, *Str. equi* isolated from a case of strangles in the horse, and a coliform organism found as the predominating organism in a mastitis milk. None of these organisms set up marked changes and all failed to establish themselves in the udder.

II. The history of the herd selected showed that mastitis had not been very prevalent. The cows were examined monthly for evidence of mastitis by two series of tests. The first series, conducted in the cow-shed, consisted of a physical examination of the milked-out udder, the detection of flakes in the milk by means of a strip-cup and the estimation of the reaction of the milk by means of bromcresol-purple papers. The second series were laboratory tests and consisted of a bacteriological examination of a composite sample of fore-milk from all quarters or of single quarter samples if stable tests showed any abnormality. In addition, an exact determination of the chemical reaction of the milk was made by an electrometric method.

During the six months period, 30 cows developed clinical mastitis which was efficiently detected by the stable tests, while the bacteriological examination of

the secretions showed a high bacterial count in which *Str. mitis* was usually found as the predominating organism. The udders of 60 cows were considered to be normal because the bacterial count of the fore-milk did not exceed 20,000 per c.c. In a few of these cases α streptococci were detected but not typed. Twelve cows were judged to be affected with a latent mastitis. The milk of four of these showed changes by the strip-cup test and a bacteriological examination showed a count of over 20,000 organisms per c.c.—*Str. mitis* being isolated from a few. [The results of this survey would be far more significant if the authors had not associated changes in the udder with high bacterial count, but concentrated on an exact qualitative analysis of each milk sample for the presence of pathogenic udder streptococci].—S. J. EDWARDS.

WHEELER, Mary W. (1932). **Notes on the Antigenic Activity of Hemolytic Streptococci from Different Types of Infection.**—*J. Immunol.* **23.** 311-314. 1 table.

Reciprocal neutralization tests were made with the toxins of eight strains and their respective antisera by intracutaneous titration in goats. Notable differences in breadth of neutralizing powers were found. Two strains, NY 5 and one other, gave sera which neutralized seven out of eight toxins used for serum production and most other toxins tested ; other sera neutralized only one or two toxins.—A. W. STABLEFORTH.

REICHEL, J., & SCHNEIDER, J. E. (1933). **Anthrax Protection Tests.**—*J. Amer. Vet. Med. Ass.* **82.** 376-388. 6 tables.

In an outbreak of anthrax it is a rare occurrence for 100 per cent. of the exposed or infected animals to die of the disease, as resistance to infection varies considerably in each individual. It is possible to prepare a virulent infective dose which will kill both the control and prophylactically treated animals, but such a heavy infection would never be met with under natural conditions. Up to the present time, it has been impossible to increase the resistance of animals experimentally to the extent that these will be resistant to an infective dose which will in itself kill all of the control animals. In this work, therefore, an infective dose was used which did not kill all of the control animals.

In sheep, using a satisfactory test dose of anthrax culture, the relative protective values of anthrax live and dead vaccine and anti-anthrax serum are given.

It was found that anthrax live and dead vaccine increased the resistance of sheep to the test dose, but further experiments are necessary to establish the duration of the immunity. Anthrax bacterin did not protect sheep against the test dose. A detailed description of the technique used in these experiments is given.—A. J. WILSDON.

GORIS, A., & STENDAL, N. (1933). Sur la composition chimique du bacille tuberculeux. [**The Chemical Structure of the Tubercle Bacillus**].—*Bull. Inst. Pasteur.* **31.** 1-13 and 65-76. [89 refs.]

This article is essentially a concise abstract and critical review of the progress which has been made since 1920 on the chemical composition of the tubercle bacillus, with special reference to the extensive concerted plan elaborated in 1926 by a group of American workers.

The review is divided into three sections devoted to an analysis of the literature on the lipids (phosphatids, acetone-soluble fats and waxes), the carbohydrates and the proteins respectively. It does not lend itself to further abstraction and should be consulted in the original.—R. E. GLOVER.

MÖLLGAARD, H. (1932). Mikrochemische Untersuchungen zur Frage der nicht säurefesten Tuberkelbacillen. [**Microchemical Studies of Non-Acid-Fast Tubercle Bacilli**].—*Beitr. Klin. Tuberk.* **79.** 515-554. 20 text figs., 24 coloured figs. on 4 plates, 2 tables.

During cultivation of pure strains of *Mycobact. tuberculosis* and of organisms from tuberculous tissue, two types of non-acid-fast organisms are obtained, (a) short rods containing diploid granules and (b) rods which produce hypha-like threads which in some instances become true actinomycetes. Two varieties of conidia or spores are produced by these actinomycetes, viz., diplococci and short rods, the latter being obtained by simple fracturing of the hyphae. The diplococci germinate to rods, which on Petroff's medium become true acid- and alcohol-fast bacilli, which cannot be differentiated morphologically from tubercle bacilli. Hence it is assumed that either the tubercle bacillus has a life cycle or that the growth of *M. tuberculosis* is always accompanied by that of an actinomycete. These conidia are always present in tuberculous lesions and in " pure cultures " derived from them. It is suggested that they are interconvertible with tubercle bacilli.

The actinomycete and coccoid forms, as found in ordinary culture or in tissue, are not stained by the usual procedures and 500 dyes were examined in order to discover one with suitable staining properties. Chloro-, sulpho-, methyl- and carbinol derivatives were prepared of the triphenylrosaniline and triphenyl-pararsaniline series and these were diazotized and coupled with a series of amino-hydroxyl-naphthalin-sulphonic acids. A new dyestuff (dye 451, preparation and constitution given) was obtained and a method suitable for staining animal tissues and blood cultures developed. By this new staining method the author has demonstrated the presence in blood cultures, from tuberculous human beings and in tuberculous tissues from calves, rabbits and human beings, large numbers of non-acid-fast bacterial forms completely corresponding in morphology and staining reactions to the spore and hyphae forms of the previously described actinomycetes. The combination of non-staining by ordinary histological processes and the staining of the young bacteria by the new method is characteristic and is not given by other bacteria, with the possible exception of certain streptococci. It is considered to be diagnostic for non-acid-fast " tubercle bacilli forms." Experiments are in progress to test the pathogenic activity of the different forms. The granulated non-acid-fast form [(a) above] can easily be separated from the acid-fast tubercle bacilli by its rapid growth on yeast and asparagin, the latter organism growing only very badly or not at all.

Preliminary experiments show that the non-acid-fast form can provoke typical tuberculous lesions which contain large numbers of the acid-fast bacilli ; inoculation into guinea pigs causes general tuberculosis. Attempts are being made to elucidate the connection of these granular forms with the filtrable " ultravirus " of CALMETTE.—W. R. WOOLDRIDGE.

NÈGRE, L., & VALTIS, J. (1932). Sur l'irrégularité de l'atténuation des Bacilles tuberculeux par réensemencements précoces. [**Irregularity in the Attenuation of Tubercle Bacilli obtained by Rapid Subculture**].—*C. R. Soc. Biol. Paris.* **111.** 607-608. [2 refs.]

The authors reported in a previous publication [see this *Bulletin.* **3.** 344.] that virulent strains of tubercle bacilli can be attenuated by subcultivating surface growths on Sauton medium every three or four days over a period of six months.

They now report that four recently isolated human strains of virulent tubercle bacilli were subjected to this procedure for a period of six months and that, when tested on guinea pigs at the end of that period, they showed no evidence of

attenuation as compared with the original strains.

Nègre and Valtis now consider that there is a greater chance of obtaining attenuation by rapid subculturing when the strains have been maintained for a long time on artificial medium.—T. M. Doyle.

Winn, W. A., & Petroff, S. A. (1933). **Biological Studies of the Tubercle Bacillus. II. A New Conception of the Pathology of Experimental Avian Tuberculosis with Special Reference to the Disease Produced by Dissociated Variants.**—*J. Exp. Med.* **57.** 239-264. 6 plates, 4 charts. [7 refs.]

From a strain of the avian type of tubercle bacillus A_1 which has been kept in the laboratory for 20 years, four types of variant have been isolated, viz., smooth S variant, flat smooth FS variant, rough R variant, and a chromogenic Ch variant. Each manifests distinct chemical and colonial characteristics. Suspensions of each variant were inoculated into chickens and an early non-specific eosinophilia followed inoculation, no matter which variant was used, after which the leucocytic response varied, being of an acute type with the S and FS variants, whilst that produced by the R and Ch variants was indicative of a chronic healing tuberculosis. The appearances of the lesions with the S variant suggested an acute toxic type of disease, whilst with the FS variant the type of response was not so acute nor rapid and described as more of a " foreign body type " to distinguish it from the former. The R and Ch variants were avirulent.—R. Lovell.

I. Nègre, L., Valtis, J., & van Deinse, F. (1933). Sur les caractères biologiques des Bacilles acido-résistants issus des éléments filtrables du virus tuberculeux. [**The Biological Characters of Acid-Fast Bacilli originating from the Filtrable Virus of Tuberculosis**].—*C. R. Soc. Biol. Paris.* **112.** 122-124.

II. Saenz, A. (1933). Sur la présence fréquente de Bacilles acido-résistants saprophytes dans le sang ensemencé par la méthode de Löwenstein. [**Saprophytic Acid-Fast Bacilli in Blood cultured by Löwenstein's Method**]. —*Ibid.* 434-435.

I. The authors have shown that repeated injections of the waxy substances obtained by extraction of tubercle bacilli with acetone into guinea pigs, previously inoculated with the filtrable virus of tuberculosis, restore the original virulence to the acid-fast bacilli which arise from the filtrable virus and permit of their cultivation on laboratory media.

It would appear from a study of the cultures thus obtained that they represent a transitional stage between the filtrable form and the acid-fast bacillus and that at this stage they are not yet definitely fixed into one of the three types, bovine, human and avian.

II. Saenz records that out of 600 samples of blood sown on Löwenstein's medium, 11 gave positive growths. Three of these 11 cultures proved to be acid-alcohol-fast bacilli which were shown by animal inoculation to be non-pathogenic.

The cultures consisted of paratubercle bacilli which had presumably been present in the circulation.—T. M. Doyle.

I. Saenz, A., Coste, F., & Costil, L. (1932). Sur l'extrême lenteur de l'évolution de la tuberculose chez les Cobayes inoculés avec du sang ne contenant que quelques Bacilles. [**The Slow Evolution of Tuberculosis in Guinea Pigs Inoculated with Blood containing Few Bacilli**].—*C. R. Soc. Biol. Paris.* **111.** 934-936.

II. Ananiadès, B., & Papanargyrou, N. (1933). Valeur comparée de l'inoculation au Cobaye et de la culture pour la recherche du Bacille de Koch dans le sang des tuberculeux. [**The Comparative Value of Guinea Pig Inoculation and of Culture in the Examination of Blood from Tuberculous Subjects for Koch's Bacilli**].—*Ibid.* **112.** 436-437. [1 ref.]

I. The authors describe three series of tests in which guinea pigs were inoculated with blood from suspected cases of human tuberculosis. All the guinea pigs became infected, the first indication being a positive reaction to the intradermal tuberculin test eight months after inoculation. The authors found guinea pig inoculation to be much more reliable than blood culture when the numbers of bacilli present were few. They also state that inoculated guinea pigs should be kept under observation for at least eight months and that results should not be regarded as negative unless after that time the guinea pigs fail to react to the tuberculin test.

II. Samples of blood were collected from 45 tuberculous patients. Half of each sample was inoculated into a guinea pig and the remaining half was treated according to Löwenstein's method and sown on Petragnani's medium and also on Löwenstein's medium. Guinea pig inoculation revealed four samples to be positive, whereas cultures reveaied nine positive samples. The results agreed in three instances. The behaviour of the organisms suggested them to be of the human type.

The authors conclude that to get the best results one should inoculate guinea pigs and also try to cultivate the organism on Petragnani's medium, which they found to give better results than that of Löwenstein.—Gwilym O. Davies.

Calmette, A. (1933). L'infection tuberculeuse spontanée du cobaye et du lapin. [**Spontaneous Tuberculosis in the Guinea Pig and the Rabbit**].—*Ann. Inst. Pasteur.* **50.** 148-160. [42 refs.]

This is a review of the literature on the occurrence of spontaneous tuberculosis in guinea pigs and rabbits. Although there have been numerous reports on this indirect infection since it was first recorded by Koch in 1884, little attention has been paid to it and precautions are rarely taken at laboratories to guard experimental animals against it.

Calmette believes that the results obtained by those authors who affirm that BCG is not uniformly and completely innocuous are attributable to cases of spontaneous infection with tuberculosis among their experimental animals.

—T. M. Doyle.

Ninni, C. (1932). Culture de l'ultravirus dans l'infection tuberculeuse héréditaire. [**Cultures of Tubercle Bacilli from Cases of Hereditary Tuberculosis**].—*C. R. Soc. Biol. Paris.* **110.** 257-259. [4 refs.]

Ninni carried out experiments to determine if it were possible to obtain cultures of tubercle bacilli from the tissues of guinea pig foetuses from tuberculous dams. Nineteen foetuses or new-born animals, the issue of naturally or artificially infected mothers, were examined.

Twenty pregnant guinea pigs were inoculated with 0·01 mg. of virulent bovine tubercle bacilli. Cultures were made from the liver, spleen and lymphatic glands on a modified Petragnani's medium and on Löwenstein's medium. Examination of the resulting growth 12 to 15 days later showed tubercle bacilli in three cases.

In other instances tubercle bacilli were recovered from the foetuses by guinea pig inoculation and subsequent culture of the organs of the inoculated guinea pigs.

Tubercle bacilli were isolated also on culture media from the liver of foetuses from guinea pigs inoculated with the filtrates of tubercle bacilli.—T. M. Doyle.

Eidherr, A. (1932). Reinzüchtung von Tuberkelbazillen aus Blut und Kot von Tieren. [**Pure Culture of Tubercle Bacilli from Blood and Faeces of Animals**].—*Wien. tierärztl. Mschr.* **19.** 385-392. 2 figs. [13 refs.]

Successful cultivation experiments were made with citrated blood from 3 cows, 3 rhesus monkeys, 4 rabbits, 6 guinea pigs, 2 cats, 2 dogs, a pheasant and 2 fowls which showed advanced tuberculosis as a result of natural or artificial infection. Failure is recorded in the case of one affected animal. 10 c.c. of blood was haemolysed with about 40 c.c. of sterile tap water from taps which had been cleaned and flamed in order to obviate possible error from the acid-fast bacilli which are frequently present. After centrifuging, the sediment, which was small compared with that obtained after haemolysis with acetic acid, was treated with twice its volume of 15 per cent. sulphuric acid for five minutes, when more water was added, the suspension centrifuged and the final deposit sown on Löwenstein's media. Macroscopic growth, in most cases good, appeared in 11 days to 2 months and in those cases tested was fully virulent for guinea pigs. In the case of bird's blood the need of some solvent for the nuclei of the red cells is noted. Earlier experiments with Löwenstein's method of haemolysis (acetic acid) were less satisfactory.

Three cultivation experiments with faeces, using 15 per cent. sulphuric acid for 5 to 15 minutes and Löwenstein's malachite green medium, which in this case is preferred to his haematin medium, are also reported. In two cases pure cultures were obtained after subculture on the same medium.

It is noted that sulphuric acid treatment does not prevent the growth of moulds and other resistant organisms.—A. W. Stableforth.

Söntgen, & Menck, F. (1933). Ist die milchserologische Feststellung der Eutertuberkulose geeignet, in den Rahmen des Tuberkulose-Tilgungs-Verfahrens, sowie der Marken- und Vorzugsmilchuntersuchungen eingefügt zu werden. [**Are Milk Serological Methods of Value for the Eradication of Tuberculosis of the Udder and for the Examination of Market Milk?**]—*Tierärztl. Rdsch.* **39.** 189-194. 2 tables. [6 refs.]

This paper is a report on the examination of milk samples by means of the complement-fixation test in order to detect cows affected with tuberculosis of the udder.

For the application of the test, a clear whey was obtained from the milk sample to be tested for use as antibody, while the antigen consisted of a standard tuberculin in 5 per cent. concentration.

The bulk milks from ten herds, each consisting of about 60 cows, were found to contain tubercle bacilli by guinea pig inoculation. Samples of mixed quarter milk from each cow were examined by the complement-fixation test and, in each herd, the milk of one cow was found to give a positive reaction. In each case, the findings of the test were confirmed by *post-mortem* examination of the udder of the reacting cow. Only five of the ten infected cows showed abnormality on clinical examination.

Favourable results with the test were also obtained on the examination of milk samples from the cows belonging to four other herds, the bulk samples from which had been found to contain tubercle bacilli.

The authors consider that the complement-fixation test is a useful supplement to the biological test for the quick detection of individual cows affected with

tuberculosis of the udder when tubercle bacilli have been found in the bulk milk sample by guinea pig inoculation.—S. J. Edwards.

Hastings, E. G., Wisnicky, W., Beach, B. A., & McCarter, Janet. (1933). **A Detailed Study of No-Lesion, Tuberculin-Reacting Cattle.**—*J. Amer. Vet. Med. Ass.* **82.** 565-583. 11 tables. [7 refs.]

This report is of considerable interest in connection with the systematic testing of cattle for tuberculosis on a large scale as in the U.S.A. It deals particularly with the results obtained in the state of Wisconsin and explains how the so-called " no-lesion " animal has become a problem of practical importance. It shows that during the period from 1894 to 1908, inclusive, 36,900 cattle were tested in that state, of which 12·6 per cent. reacted. As the result of an educational campaign the numbers greatly increased, so that in 1909 as many as 48,000 cattle were tested ; in 1910, 207,000 ; and in 1911, 32,000. Of the animals tested from 1909 to 1912, however, only 3·6 per cent. reacted to the test as compared with 12·6 per cent. in the earlier period. In 1910, when the greatest number of animals was tested, the reactors found amounted to 3 per cent.

At this period the no-lesion problem obtruded itself, the percentage of reacting cattle that failed to show lesions of tuberculosis on slaughter being 17·2 per cent. in 1909, 21·8 per cent. in 1910 and 12·2 per cent. in 1911. A study of the records indicated that the no-lesion case was not associated with the person performing the test, nor did it appear to be related to the type of herd tested. The incidence of such cases awakened some hostility to the test and rendered the scientific investigation of the problem a matter of considerable importance.

As the result of the observations recorded, it is suggested that some organism or organisms other than the bovine tubercle bacillus may sensitize cattle to tuberculin and it is believed that the organisms to which consideration should be given in this connection are the avian and human tubercle bacilli, possibly also Johne's bacillus and the saprophytic members of the tubercle group of bacteria. It is also thought that the herd-history may, in the final stages of the eradication of bovine tuberculosis, serve as a supplement to the tuberculin test. In Wisconsin, herds in which no-lesion reacting animals have been demonstrated are placed on a suspected-herd list until they have passed one completely negative test ; while herds from which animals showing lesions have been removed are kept on the suspected-herd list until they have passed two negative tests.—Ll. E. W. Bevan.

Rousseau. (1932). Au sujet des défaillances de la tuberculine. [**Errors in the Tuberculin Test**].—*Bull. Soc. Méd. vét. prat. Paris.* **16.** 88-92.

Richart. (1932). Observations relatives aux tuberculinations pratiquées en Californie. [**Tuberculin Tests in California**].—*Ibid.* 111-112.

Rousseau describes the result of the application of the intradermal test of Moussu to 75 cattle. The animals were slaughtered three to four days after the completion of the test and subjected to a careful *post-mortem* examination.

In 19 animals which gave clear-cut oedematous reactions and were classified as positive, tuberculous lesions were found in each case : four animals which failed to react to the test showed tuberculous lesions, limited to the bronchial and mediastinal glands in three instances, while the fourth was a generalized case : 52 were negative to the test and were free from visible lesions.

In the course of the discussion which followed, several speakers referred to the occurrence of delayed reactions appearing between the third and seventh days after injection. It was suggested that occasional discrepancies in the intradermal test might be connected with this phenomenon.

Richart summarizes the opinions of FREY on the results of tuberculin tests in California. FREY regards the intradermal test as the most reliable, but considers that the double ophthalmic method is of value in revealing very advanced cases which often fail to respond to the other tests. Skin reactions which appear on the first or second day and disappear on the third are not classed as positive responses, but reactions persisting over the third to seventh day indicate a tuberculous infection.—R. E. GLOVER.

MOLLIN, F. E. (1933). **Accrediting Range and Semi-Range Cattle as Tuberculosis-Free.**—*J. Amer. Vet. Med. Ass.* **82.** 432-452.

In his address before the American Veterinary Medical Association, the Secretary of the American Livestock Association quoted figures showing the relatively low incidence of tuberculosis in range and semi-range cattle, demonstrating that, in some cases, it is lower than that which has been achieved in modified accredited areas. He proposed that cattle living under range or semi-range conditions should not be submitted to the tuberculin test *en masse* in order to qualify for accreditation, but that carcasses found to be tuberculous in the abattoir should be traced to their origin and that this should be used as a basis for accreditation. He claimed that this would be a practical plan which would not involve great expenditure and which would obviate the shrinkage due to handling and rehandling of range cattle during testing.

In the subsequent discussion the plan met with considerable opposition, chiefly on the grounds that states which had become accredited at great expense ought to be maintained free from tuberculosis and should not be subject to the inroads of cattle from herds which had not been tested in their entirety. It was pointed out that this system could not eradicate the disease, though it might indicate the prevalence of tuberculosis. Regret was expressed that full details of the proposed plan were not given.—EDWARD F. PECK.

VON BORNSTEDT, Silvia, & RÖHRER, H. (1932). Untersuchungen über die Tuberkulinkehllappenprobe beim Huhn. [**Studies on the Wattle Tuberculin Test in the Fowl**].—*Zschr. Infektkr. Haust.* **41.** 241-275. 6 figs., 8 tables. [1 ref.]

HELM, R. (1932). Die Tuberkulinkehllappenprobe beim Huhn. [**The Wattle Tuberculin Test in the Fowl**].—*Arch. wiss. prakt. Tierhlk.* **65.** 320-330. 2 tables. [26 refs.]

These two articles deal with an enquiry into the reliability of the wattle tuberculin test for the eradication of tuberculosis from poultry. After testing a large number of fowls, results showed that a fair proportion of them reacted positively although there was no evidence of infection on *post-mortem* examination.

An extensive investigation by Bornstedt and Röhrer into the cause of such a failure showed that a positive reaction did not necessarily co-exist with obvious pathological processes of tuberculosis, but might be due to other factors. From the results of repeated application of the tuberculin test, it appeared that a state of tuberculin sensitivity was established in which condition fowls gave a positive reaction to the wattle test. Another explanation for the apparent failure of the test could be found in the fact that the presence of tubercle bacilli alone gave rise to a reactive state long before any pathological changes had taken place—in other words, the test detected the earliest stages of infection.

Helm states that the shortcomings of the test might be reduced by the use of a selected tuberculin and the reading of reactions at the 48th hour after injection.

—S. J. EDWARDS.

MANTEUFEL, P., & KOTTMANN, E. (1932). Untersuchungen über die diagnostische Bewertung der Blutkultur bei experimenteller Kaninchentuberkulose. [**Experiments on the Diagnostic Value of Blood Cultures in Experimental Tuberculosis of Rabbits**].—*Zschr. Immun.-Forsch.* **74.** 25-30. 1 table.

MISHULOW, L. H., & PARK, W. May. (1932). **Tubercle Bacilli in the Blood Stream of Rabbits during the Course of Infection.**—*J. Prevent. Med.* **6.** 94-99. 2 figs., 3 tables. [2 refs.]

I. Tubercle bacilli were grown from the heart blood obtained *post-mortem* from five rabbits which died of severe artificially produced tuberculosis. The blood was treated with 15 per cent. sulphuric acid. Macroscopic colonies were visible after 14 to 20 days incubation. During life, positive blood cultures were only obtained on 4 out of 34 occasions, in 3 cases from the same animal. In only one case was the primary growth macroscopic. Positive cultures were only obtained during the later stages of infection.

II. Two rabbits were inoculated intravenously with a large dose of human tubercle bacilli, and bled into citrate from the opposite ear 5 minutes to 15 days after injection. One part of the citrated blood was spread with a little distilled water on Bordet-Gengou and on Löwenstein's media for colony counts, the other was inoculated into guinea pigs.

The authors conclude that there is probably a rapid localization of injected tubercle bacilli as shown by the marked decrease between 12 and 24 hours and the steady decrease up to the fourth day. Organisms were always present during the course of the infection though in varying numbers. In one animal there was a marked rise on the day of death.—A. W. STABLEFORTH.

—. (1933). **BCG. Vaccination Against Tuberculosis. Prof. Calmette's Reply to the Ministry of Health.**—*Lancet.* **224.** 653-655. 1 table. [3 refs.]

At the permanent committee of the Office Internationale d'Hygiène Publique, Sir George Buchanan, as delegate for the United Kingdom, presented a note summarizing the British attitude, from the administrative and official side, towards BCG. Neither government departments nor local authorities have made any attempt to organize a supply of BCG or to advocate its use. It is recognized that the vaccine is widely used in other parts of the world and recommended by many high authorities, nevertheless it is considered that the present system as practised in the United Kingdom is adequate for the situation.

" As MacNalty has shown the mortality from tuberculosis in the younger age-groups has been diminishing with great rapidity in recent years. Under the age of one year the total deaths in England and Wales attributed to tuberculosis (all forms) were no more than 585 in 1930; in 1921 the corresponding figure was 1,311."

Professor CALMETTE in his reply to this note points out that there has been no notable decrease of the death rate from tuberculosis between the ages of 15 and 40 years either in England or in other countries of Northern Europe and that the number of infected persons giving a positive reaction to tuberculin is probably the same to-day as it was 20 years ago.

Vaccination against tuberculosis does not confer immediate protection, yet even when isolation is not strictly carried out during the pre-immunity period extensive experience has proved that BCG generally gives sufficient protection.

CALMETTE states that observations of DEBRÉ, LELONG and PICKET have shown that vaccinated children remain resistant to virulent infection for more than five years.—T. M. DOYLE.

I. Guérin, C. (1933). Etat de la question de la prémunition antituberculeuse chez les Bovidés par le BCG en France. [**Present Position of Immunization against Tuberculosis in Bovines with BCG in France**].—*Rec. Méd. vét.* **109.** 5-10. [1 ref.]

II. Hanhart, A. G. (1932). La tuberculose bovine—Les moyens de la prévention—Le B.C.G. [**Bovine Tuberculosis. Methods of Prevention. BCG**].—*Thesis for Docteur vétérinaire, Alfort.* pp. 75. [29 refs.]

I. Guérin, in reply to criticisms of the BCG method, points out that to ensure success it is absolutely essential to remember the advice " that the vaccination by BCG of bovines should be confined exclusively to new-born calves, or those not over 15 days old, that they should be strictly isolated from the day of their birth and fed with tuberculosis-free milk not only from the date of their birth but from one month after vaccination." He is of the opinion that non-success of the BCG method is due to neglect of those instructions. He adds that since 1924 more than 40,000 calves have been vaccinated and revaccinated in France alone. The number of doses of BCG vaccine required increases each year and it appears obvious that this would not be the case if no benefits had been observed. As Guérin states, it would be impracticable to publish all the observations he possesses, but he quotes the following reports—one on a small scale, one on a medium scale and one on a large scale.

(1) In 1924, 60 calves in badly infected cow-sheds were vaccinated and revaccinated ; they were not isolated and were fed on unsterilized milk of their dams. Several of the animals were placed in the first class at shows held in 1929 and 1930. All were eventually slaughtered and no lesions of tuberculosis were found in any of them.

(2) In 1924, a veterinarian vaccinated 334 calves once, 132 twice, 51 three times, 34 four times, 13 five times, 4 six times, and 1 seven times. 196 were sold for breeding purposes and all appeared healthy, 32 were sold to butchers and no evidence of tuberculosis found in them, 3 young cows (two vaccinated four times, one seven times), born of tuberculous mothers, when slaughtered were found free from tuberculosis. Two calves only proved to be tuberculous ; they were born of tuberculous mothers and fed on the mothers' milk, one cow having a tuberculous udder. Prior to 1924, six to eight young animals from the herd were destroyed annually for tuberculosis, but none have been affected since vaccination was started.

(3) In 1925, 60 per cent. of the cows in certain cow-sheds reacted to the tuberculin test ; all the calves born were vaccinated, not isolated and fed on mixed milk. All grew up in good health.

From February, 1925 to February, 1932, 892 calves were vaccinated and re-vaccinated. Of this number, 163, two months old, and 159, at ages varying from 18 months to 5 years, were sent to the butcher ; no lesions of tuberculosis were discovered after specially careful examination. Seventy-eight were sold for breeding and no evidence of disease has been found in any of them : one animal aged 10 months was affected with generalized tuberculosis ; its mother was clinically tubercular and died one month after calving ; she nourished the calf during that month and the calf was not isolated.

Finally, the veterinarian who carried out this work states that, after seven years of experience of more than 2,000 inoculations on nearly 900 subjects, he is satisfied as to the absolute innocuity of BCG and the certain efficacy of the method.

II. This thesis contains nothing new, but gives a résumé of the history of attempts to prevent tuberculosis in herds by immunization, referring to the works of Löffler, Levy, Noguchi, Zeuner, Moussu and Goupil, Rappin, Behring,

Ceronson, Koch, de Denys, Löwenstein, Rosenbach, Vallée, Klebs, Gessen, Ishigami, Marmorek, Bruschettini, Meyer and Ruppel, and finally Calmette and Guérin. After a brief description of Vallée's method, the author gives in detail evidence for and against Calmette and Guérin's method which is now familiar to all interested in this subject, concluding that further experimental work is still necessary before a definite decision can be made on certain points. —T. Dunlop Young.

Gerlach, F. (1932). Ueber die bisherigen Ergebnisse der Tuberkuloseschutzimpfungen mit B.C.G. bei Rindern in Österreich. [**Results of BCG Vaccination on Cattle in Austria**].—*Wien. tierärztl. Mschr.* **19.** 353-366.

The author summarizes the results obtained with BCG up to 1932 in the vaccination of about 4,000 new-born calves born in heavily infected herds. Results, both at the author's institution (Bundesanstalt für Tierseuchenbekämpfung, Mödling bei Wien) and of several veterinary practitioners, have been very good and the author is satisfied as to the innocuity and efficacy of BCG for calves.

Gerlach advocates the international adoption of a uniform mark indicating BCG-inoculated animals for the purpose of removing the difficulty of tuberculin sensitivity which such animals possess.—J. E.

Calmette, A., & Saenz, A. (1933). Sur l'immunité para-spécifique conférée par le BCG. [**Paraspecific Immunity conferred by BCG**].—*Ann. Inst. Pasteur.* **50.** 433-445. [19 refs.]

The authors state that since the introduction of BCG it has been frequently observed, in both human and veterinary practice, that vaccinated children and young animals appear to be more resistant to the usual infantile and calfhood infections than those not so vaccinated.

Excluding tuberculous infection, the general mortality among BCG-vaccinated children and animals is uniformly less in every country than among non-vaccinated. This may be attributed either to the mortality from tuberculosis in the young being considerably higher than would appear to be the case from the statistics, or that BCG confers, in addition to a specific immunity, a state of resistance or immunity towards different infections distinct from tuberculosis which may be termed a " paraspecific immunity."

Calmette and Saenz favour the second hypothesis and adduce numerous analagous instances in support of it. They consider that this paraspecific immunity is so generally recognized in children and young animals inoculated with BCG that it is no longer possible to doubt its reality. They believe it to be the result of either the slow impregnation of the central and peripheral nerve cells by the bacterial toxins produced by the BCG, which renders these cells less sensitive to other toxins, or to the strong progressive stimulation of the phagocytes, free and fixed, which allows them to digest bacteria of a lower virulence than tubercle bacilli.

This paraspecific immunity may be seen in the infections caused by streptococci, pneumococci, *Br. abortus* and by *B. anthracis*.—T. M. Doyle.

Friedmann, F. F. (1932). Entfaltet das Friedmannsche Heil- und Schutzmittel bei Hühnern zur Bekämpfung der Geflügeltuberkulose ausreichende schützende und heilende Eigenschaften? [**Does Friedmann's Vaccine for Fowls display Satisfactory Protective and Curative Properties for the Campaign against Avian Tuberculosis?**]—*Deuts. tierärztl. Wschr.* **40.** 718-720.

EBER, A. (1932). Schlusswort zu obigen Bemerkungen. [**Final Reply to Above**]. —*Ibid.* 720-721.

Polemic on the article entitled as above by EBER and MALKE [see this *Bulletin.* **3.** 462]. Friedmann claims that the method in question is used with success by hundreds of veterinarians many of whom experimented with large numbers of fowls. He attributes EBER and MALKE'S unfavourable results to their use of tuberculin as a test of immunity, believing that they have thus prevented the immunizing and curative action of the vaccine.

Eber replies that in the second part of his experiments no tuberculin was used, and that even when exposure to infection was so light that few only of the controls became infected, no protective effect of Friedmann's vaccine was evident.

—A. W. STABLEFORTH.

POISSON, H., & BUCK, G. (1932). Sur trois cas intéressants de lymphangite ulcéreuse du Cheval. Coup d'oeil historique sur l'existence de cette maladie à Madagascar. [**Three Interesting Cases of Ulcerative Lymphangitis in Horses. A Brief Historical Summary of that Disease in Madagascar**].—*Rec. Méd. vét. exot.* **5.** 207-213. 1 photograph. [31 refs.]

This article commences by giving clinical particulars of three cases of ulcerative lymphangitis which terminated fatally by reason of metastases in 32, 18 and 13 days respectively. Accounts of the *post-mortem* findings and subsequent laboratory examinations follow. In the first and third cases the metastases were widespread, but were most abundant in the lungs. In the second case the kidneys were affected mainly : the right kidney was the seat of an abscess which opened into the abdominal cavity, whilst the left contained 2 l. of pus and weighed 5·5 kg. In the first two cases helminths, which are not described, were present abundantly in the alimentary canal and the authors suggest that it was the debilitating action of these parasites that paved the way for the profound metastases.

The second part of the article summarizes published literature relating to ulcerative lymphangitis in Madagascar since the year 1897. The losses occasioned by the disease have been so heavy that horse-breeding and rearing have become impossible in certain districts of the island. The authors are in agreement with GUILHEM, CAROUGEAU and other observers who believe that the disease is transmitted by ticks and they emphasize the need for further investigation to determine whether its incidence is related to the prevalence of these parasites.

—A. A. PRYER.

URBAIN, A., & GUILLOT, G. (1932). Sur le pouvoir floculant de la toxine du Bacille de Preisz-Nocard. [**The Flocculating Power of the Preisz-Nocard Bacillus**].—*C. R. Soc. Biol. Paris.* **110.** 1226-1227.

Details are given of tests conducted to determine whether flocculation takes place when the toxin of the Preisz-Nocard bacillus is mixed with anti-Preisz-Nocard serum.

The method followed in the tests was that described by RAMON.

The authors found that flocculation took place regularly in three to eight hours when the toxin was mixed with serum from a hyperimmunized rabbit or with serum from horses with chronic infection. The phenomenon was specific as similar reactions were not obtained with antitetanic serum, antidiphtheritic serum nor with sera from normal horses or rabbits. Similarly, anti-Preisz-Nocard serum failed to produce flocculation when mixed with either tetanus or diphtheria toxin.—GWILYM O. DAVIES.

I. Harrington, C. F. (1933). **Field Observations on Erysipelas in Swine Herds.**—*J. Amer. Vet. Med. Ass.* **82.** 492-503. [Paper presented at the 36th Annual Meeting of the United States Live Stock Sanitary Association].

II. Schoening, H. W., & Creech, G. T. (1933). **An Agglutination Test for Swine Erysipelas.**—*Ibid.* 503-508. 2 tables. [1 ref.]

III. Baker, D. W. (1933). **An Account of the Occurrence of Hog Erysipelas Infection in New York State.**—*Cornell Vet.* **23.** 66-70. 1 fig. [3 refs.]

I. The author has investigated swine erysipelas on more than 100 farms in South Dakota. An urticarial form has been recognized for a number of years and is of little economic importance. In 1932, the disease appeared in epizootic form amongst pregnant sows or sows and their litters, but otherwise a seasonal variation in outbreaks occurs.

When the acute form does not terminate in death, chronic developments are seen, such as skin sloughing in old hogs and arthritis with enlarged joints in young animals. Pronounced enlargement of joints only appears when the infection becomes chronic. *Post-mortem* findings are not constant and of 50 pigs and sows slaughtered, many in the chronic stage, only one showed verrucose endocarditis.

Until the disease in small pigs passes into the chronic stage with symptoms of arthritis, diagnosis is very difficult. The skin discolouration of swine erysipelas and swine fever are indistinguishable. Glueing of the eyelids, seen so constantly in swine fever, is absent in swine erysipelas. The rapid agglutination test greatly simplifies diagnosis.

Treatment with antiserum after the disease has passed into the chronic form is unsatisfactory. Its use in the acute stage seems to prevent chronic developments.

The author regards the disease as of considerable economic importance.

II. In preparing the antigen the organisms are grown in liquid media for 36 to 48 hours, centrifuged, washed in saline containing 1 per cent. formalin, again centrifuged and suspended in formol-saline, shaken in a machine, filtered through cotton wool and standardized. For the tube test, a suspension of twice the density of McFarland's tube No. 1 and for the whole-blood test, 50 times the density of tube No. 1 is used.

Field and laboratory agglutination tests of 20 herds have recently been carried out, together with a cultural examination of tissues such as spleen, kidney, affected joints, etc.

In using the agglutination test as an aid to diagnosis, a number of animals in a herd should be tested before reaching a conclusion. Positive reactions for swine erysipelas do not exclude the co-existence of swine fever.

Eighty-seven tonsils were examined from a herd in which swine erysipelas was believed to have been present previously, the pigs being normal at the time of slaughter. *Erysipelothrix rhusiopathiae* was recovered from one tonsil. In nine of these animals the serum was positive and in 18 it was suspicious. Definite clearing and clumping at 1 : 100 dilution of serum was accepted as positive in these pigs.

From infected pigs, clearing and clumping is seen up to 1 : 200 dilution and in most cases at 1 : 1,000 or over. When such sera are used in the whole-blood test, clumping occurs in 15 seconds to one minute. With the blood of apparently normal hogs, clumping takes place in two to three minutes. Positive reactions are those in which marked clumping occurs within two minutes, using one drop of blood with two drops of antigen.

In the arthritis stage of the disease, agglutinins are present in considerable quantity.

III. This article records the presence of swine erysipelas in New York State

and it is suggested that the infection may be widely distributed there. The disease has been recognized as being present in the United States for more than ten years. The acute form caused almost a total loss in some herds in the western states in 1932. The lesions and bacteriological findings are the same as in other parts of the world.—S. H. GAIGER.

KLAUDER, J. V. (1932). **Erysipeloid : Bacillus of Swine Erysipelas Infection—a Disease of Industry.**—*J. Indust. Hyg.* **14.** 222-234. 3 figs. [4 refs.]

Attention is drawn to erysipeloid, a human infection due to *Erysipelothrix rhusiopathiae*. It occurs at the site of injury in workers in various industries coming in contact with living and dead matter of animal and plant origin. The causal organism is widely disseminated and, according to other authors, may be present in healthy as well as in diseased swine. It has also been recorded in cattle, sheep, birds and mice. It may be pathogenic or saprophytic. The virulence of the bacterium varies in different animals and can be modified by passage through laboratory animals.

A description of the mild, severe and chronic forms of swine erysipelas is given and compared with the forms occurring in man. In human beings the mild form, occurring at the site of injury and appearing as a purplish-red erythema, is the common form, the acute fatal and arthritic forms being rare. In swine the chronic form, combining a vegetative endocarditis, appears to be the common type met with.

In human beings the author finds its incidence most frequent amongst commercial fishermen who handle live fish. Spiny fish increase the incidence of trauma of the hands which serves as a means of inoculation. Probably the organism is a saprophyte on the slime of fish. The disease also occurs among employees in the meat packing and canning industries, especially among workers in industries where living or dead animal matter is handled. The most satisfactory treatment appears to be the local injection of immune serum.—R. LOVELL.

GURWITSCH, B. M., & OLEINIKOW, D. W. (1932). Materialien zur Bewertung der Ergebnisse der Vakzination gegen den infektiösen Abortus der Stuten. [**Data for the Appraisement of the Results of Vaccination against Infectious Abortion in Mares**].—*Zschr. Infektkr. Haust.* **41.** 177-186. 1 table. [19 refs.]

The authors point out that there is a difference of opinion among those who have investigated the subject, as to whether vaccination of mares against infectious abortion caused by organisms of the paratyphoid type is of value or not. Similarly, there is no agreement as to the time at which vaccination should be carried out. According to some it should be done early, while others hold that, as the immunity produced is of short duration, it should be carried out late in pregnancy. The latter point induces others to recommend repetition of vaccination during the period. Again, vaccination is, in the view of some, quite unnecessary, because spontaneous recovery from the infection is of common occurrence.

The authors give their own experience of the use of vaccine in a remount depot in the North Caucasus. The vaccine contained 30 strains of the organism. Cultures were made on agar, were washed off in normal saline, and killed with 0·2 per cent. formol. The vaccine contained 2×10^9 organisms per c.c. Three doses were given at intervals of a week, the first being 2 to 3 c.c., the second 2 to 6 c.c. and the third 4 to 8 c.c.

Vaccination resulted in a rise of temperature which lasted about two days, and a local infiltration measuring 10×12 cm. As a rule the reaction to the second dose was somewhat more pronounced. Vaccination during the later

stages of pregnancy produced no ill-effects. The results are tabulated as follows :—

		Foaled.		Barren.		Aborted.	
		No.	per cent.	No.	per cent.	No.	per cent.
(1) Total number of mares.							
A. Vaccinated	208	147	70·8	50	24·0	11	5·2
B. Controls	37	26	70·3	10	27·0	1	2·7
(2) Mares aborted in 1928 prior to vaccination.							
A. Vaccinated 1928	38	27	71·0	8	21·0	3	8·0
B. Controls	7	7	100·0	—	—	—	—
(3) Mares that had not aborted prior to vaccination							
A. Vaccinated	170	120	70·6	42	24·7	8	4·7
B. Controls	30	19	63·4	10	33·3	1	3·3

It is pointed out that in estimating the value of vaccination, the occurrence of natural recovery must not be lost sight of.—A. Leslie Sheather.

I. Edwards, P. R. (1932). **Serologic Characteristics of Shigella equirulis (B. nephritidis-equi.).**—*J. Infect. Dis.* **51.** 268-272. 1 table. [8 refs.]

II. Edwards, P. R. (1932). **Studies on Rough and Smooth Variants of Shigella equirulis (B. nephritidis-equi).**—*J. Bact.* **24.** 283-298. 3 figs. on 1 plate, 2 tables. [7 refs.]

I. *Bact. equirulis* is recognized in America as a serious factor in septicaemia, arthritis and nephritis of young foals. Forty cultures were isolated *post-mortem* from young foals and a serological study was carried out. Seven immune sera were prepared and the results obtained by agglutination, precipitation, complement-fixation and agglutinin absorption were in close agreement, indicating that the organisms form a heterogeneous serological group. Only three cases of serological identity were noted.

II. A further study by the same author indicates that *Bact. equirulis* exists normally in two colonial forms. Rough cultures are invariably mucoid and are more commonly isolated from diseased foals. Smooth forms are non-mucoid and may be isolated together with the rough forms, but rarely alone, from cases of disease. The trend of variation in artificial cultures is from rough to smooth and there appears to be a transitional stage of smooth mucoid forms. The stability of the rough form varies and if it is to be maintained in the rough state indefinitely then constant artificial selection of colonies from plate cultures is necessary. Growth in broth, incubation at lower temperatures and an alkaline reaction favour the development of the rough form. Growth on agar, incubation at a temperature above 37°C. and an acid reaction accelerate the change from rough to smooth.

The two forms were shown to be closely related to each other serologically by agglutination, agglutinin absorption and precipitation tests, although the rough

forms appeared to produce a larger amount of specific substance than the smooth forms. Their biochemical reactions were identical, but owing to the absence of a suitable experimental animal it is not possible at present to estimate comparative virulence, although both forms are capable of producing local abscesses in adult horses.—R. Lovell.

Jensen, C. O. (1933). Undersøgelser over " hvid Kyllingediarrhoes " (Hønsetyfus') Udbredelse i Danmark. 3. Meddelelse 1931-32. [**Investigations into the Spread of Pullorum Disease (Fowl Typhoid) in Denmark. Third Report 1931-1932**].—*Maanedsskr. Dyrl.* **44.** 561-567.

Christensen, N. P. C. (1933). Coccidiose hos Kyllinger. [**Coccidiosis in Chickens**].—*Ibid.* 568-574. [6 refs.]

I. The report gives an account of the results of eradication work on pullorum disease in Denmark mainly carried out on a voluntary basis.

From February, 1928, to April, 1930, there have been carried out at the State Veterinary Serum Laboratory, Copenhagen, agglutination tests of blood samples from fowls in 767 flocks, of which 473 flocks (61·6 per cent.) proved to be free from disease and 3 suspicious, while 291 flocks (37·9 per cent.) contained reacting birds. From the 1st of April, 1930 to the end of March, 1931, 1,130 flocks were tested, of which 783 (69·3 per cent.) were free from disease and 347 (30·7 per cent.) were diseased. In the financial year 1931-1932 the number of tested flocks was 1,165 with no reactors in 876 (75·2 per cent.), while reactors were demonstrated in 289 flocks (24·8 per cent.).

The decrease of the number of diseased flocks will no doubt continue in the current year. There has also been a constant decrease into the number of reacting birds as shown in the following table :—

	Number of tested birds.	Positive reaction.
1928-1930.	131,387	5·60 per cent.
1930-1931.	205,622	3·10 ,, ,,
1931-1932.	240,429	2·65 ,, ,,

From the 1st of April, 1932, to the 31st December, 1932, the figures were 106,237 with only 1·7 per cent. reactors.

In spite of the good results of the voluntary eradication, a system of state legislation is undoubtedly required in order to obtain complete eradication. The first steps in this direction is mentioned by Christensen [II].

II. Regulation of the 22nd of February, 1932, of the Ministry of Agriculture's orders [Denmark] is to the effect that, in cases of suspected pullorum disease in breeders' incubating establishments, the carcasses of chickens which have died should be forwarded to the State Veterinary Serum Laboratory for examination.

In accordance with this regulation the Laboratory received up to September, 1932, chickens from 204 incubating establishments and poultry farms. The chickens were examined for coccidiosis as well as for pullorum disease and the latter was diagnosed in 30 cases (14·7 per cent.). Mortality was very high in the flocks concerned, in many cases nearly 100 per cent.

The author, who undertook the examinations, reviews and discusses in general the knowledge of the disease and methods for its eradication.

—H. Lorenzen (Sonderborg).

Priestley, F. W. (1933). **The Absence of Serological Relationship between Brucella and Pasteurella Organisms.**—*J. Comp. Path. & Therap.* **46.** 38-41. 3 tables.

The author carried out extensive tests to confirm the observations of MALLMAN (1930), and EMMEL and BOEVERS (1932) that a serological relationship exists between the genera pasteurella and brucella.

Twenty brucella strains, 16 of the bovine and 4 of the porcine variety, were tested. Forty pasteurella strains were used; these were obtained from most animal species commonly infected with pasteurella; three of these strains were atypical in that they failed to produce indol and seven were atypical in that they did not ferment mannite.

Details are given of the preparation and standardization of the antigens and of the technique of the tests. The sera used were prepared in rabbits and hens by intravenous inoculation of cultures of the various strains. One composite sample of bovine sera from abortion-infected animals was also used.

In the first experiment, 20 *Br. abortus* antigens were tested against 11 pasteurella sera and no trace of agglutination occurred. Twelve pasteurella antigens were tested against three brucella antisera and against the composite bovine serum, with negative results. Absorption of brucella sera by heavy suspensions of rough, blue and fluorescent types of *Past. aviseptica*—HUGHES (1930)—failed to lower the titre for *Br. abortus*.

In another series of cross-agglutination tests, hen sera were used in place of rabbit sera, but no agglutination occurred.

In view of the extent of the tests and the number of strains used, Priestley concludes that there is no cross-agglutination between pasteurella and brucella. —T. M. DOYLE.

I. FITCH, C. P., & DONHAM, C. R. (1933). **A Discussion of some Fundamental Principles and Practices underlying the Application of the Agglutination Tests for Bang's Disease.**—*J. Amer. Vet. Med. Ass.* **82.** 46-53. 4 tables.

II. HALL, I. C., & LEARMONTH, R. (1933). **A Method for Securing Clear Serums from the Milk of Cows and Goats for Agglutination Tests, with Special Reference to Undulant Fever.**—*J. Infect. Dis.* **52.** 27-38. 1 fig., 2 tables. [33 refs.]

I. The authors discuss some of the fundamental principles of the tube agglutination test and the rapid (plate) agglutination method. One essential difference is that the ratio of serum to antigen is very different in the two methods. In the tube method the ratio of serum to saline is relatively small, whereas in the rapid method there is a relatively high ratio of serum to antigen, and this ratio changes markedly in the different dilutions employed.

It has been shown experimentally that the saline solution in the antigen exercises an inhibitory influence on the agglutination reaction in the rapid method, possibly on account of its effect in diluting the serum.

The addition of small amounts of gelatine increases the sensitivity of the rapid-test antigens.

[The article should be read in the original by those interested in the subject].

II. Hall and Learmonth recommend the addition of a few cubic centimetres of either carbon tetrachloride or chloroform and a small amount of rennet extract to goats' milk in order to obtain a clear whey. The tubes are shaken for several minutes to extract the fat and are then incubated for one hour at 37°C. to coagulate the casein. They are then centrifuged for 15 minutes at 2,000 R.P.M. to separate the milk serum which will be found in a clear deep layer at the top, with a compact curd in the centre and the solvent at the bottom.—T. M. DOYLE.

LAUN. (1933). Vergleichende serologische Untersuchungen auf Abortus-Bang mittels der Agglutination, der Komplementbindung, der MKR.-Meinicke

und der AKR.-Menck. [**Comparative Serological Investigations into** *Brucella abortus* **Infection in Cattle by Means of the Agglutination Test, the Complement-Fixation, the MKR.-Meinicke and the AKR.-Menck Tests**].—*Berl. tierärztl. Wschr.* **49.** 129-133. 2 tables. [23 refs.]

At the Wurttemberg Veterinary Research Institute the agglutination and complement-fixation tests are used for the serological diagnosis of *Br. abortus* infection. Laun emphasizes the inconvenience of depending upon experimental animals for the complement-fixation test; he gives at first the history of the simpler Meinicke lipin reaction modified by Menck destined to replace the complement-fixation test. He adds a detailed description of his own preliminary attempts on this subject. He concludes therefrom that both the "MKR" [Meinicke's clearing reaction] and the "AKR" [Menck's abortion clearing reaction] carried out with original Meinicke lipoidal extracts and with Fleischhauer's "abortigen" are suitable to replace the complement-fixation test as a supplement to the agglutination test.

Research on the MKR and AKR and other similar tests is continuing at the above institute.—F. W. Müller (Berlin).

van der Hoeden, J. (1933). Die Ophthalmoreaktion bei Bang-Infektion (ansteckendes Verkalben) der Kuhe. [**The Ophthalmic Reaction in Bovine** *Brucella abortus* **Infection**].—*Arch. wiss. prakt. Tierhlk.* **66.** 124-135. 3 figs., 1 table.

The author has compared the value of an ophthalmic test with the agglutination and complement-fixation tests for the diagnosis of *Br. abortus* infection in cattle.

The antigen for the ophthalmic test was prepared from a smooth strain of *Br. abortus*. The culture, grown on agar for two days at 37°C., was emulsified with saline to give a thick suspension, heated at 56°C. for 36 hours and equal parts of sterile glycerin added. For the test, two to three drops of this reagent were dropped into the eye and a positive reaction was denoted by a profuse discharge of purulent exudate.

Results of the examination of 169 animals belonging to five herds showed that, in general, there was close agreement between the ophthalmic test and the other two. The difficulty attached to the test was the determination of the optimum time for reading the reaction. In some cases a positive reaction occurred eight hours after instillation and had disappeared by the 16th hour, whereas in others the reaction did not appear till the 16th hour.

In the case of two animals artificially infected with *Br. abortus*, it was seen that a reaction was obtained with the ophthalmic test seven days after inoculation, at which time the agglutination and complement-fixation tests were also positive. One animal injected with a killed culture of *Br. abortus* did not react to the ophthalmic test although the other two tests were positive.—S. J. Edwards.

Bang, O., & Bendixen, H. C. (1932). Traenger Kastnings bakterien ind gennem normal Hud, og er dette en vigtig Smittevej ved Kudgets smitsomme Kastning? [**Does** *Br. abortus* **penetrate Unbroken Skin, and is this an Important Way of Infection in Enzootic Abortion of Cattle?**]—*Med. dansk. Dyrl.* **15.** 1-15.

Feeding experiments with *Br. abortus* raised doubts in the authors' minds as to whether infection through the intestinal tract is the principal channel of infection. Their attention was then directed to infection *via* the skin, described by Cotton and Birch. [See this *Bulletin*. **2.** 321].

The first series of experiments, started in March, 1931, was made on three

pregnant cows. It was found that *Br. abortus* can penetrate shaved skin and, when the epidermis is the seat of superficial lesions, the skin of the teats.

The second series, made on two cows and two heifers, proved that *Br. abortus* can penetrate both shaved and unbroken skin of the hind legs as well as the skin of the teats, particularly when the epidermis of the teat is slightly scarified.

Attention is drawn to the possibility that latent as well as clinical forms of mastitis caused by other organisms also may be produced by infection through the skin.—H. Lorenzen (Sonderborg).

I. McCapes, A. M. (1932). **The Control of Bang's Disease in Range Animals.**—*J. Amer. Vet. Med. Ass.* **80.** 187-196.

II. Lewis, W. K. (1932). **Experiences and Results of State Quarantine against Abortion Disease.**—*Ibid.* 333-336.

III. Birch, R. R. (1932). **Some Principles Underlying Official Regulations for the Control of Bang's Disease.**—*Cornell Vet.* **22.** 134-140.

I. McCapes has collected information on the incidence of abortion disease in range herds and semi-range herds of cattle. It would appear that in strictly range herds (herds unconfined at any time) it does not cause serious loss, but in semi-range herds (herds held in fenced areas during certain times of the year) the disease gives rise to considerable losses.

The difficulty of eradicating the disease in range herds by blood tests was emphasized by Butler, Montana, who recommends limiting the breeding season to three months, or preferably two months and the disposal of dry cows in the autumn.

Several instances are quoted of the success attained in eradicating abortion disease from semi-range herds by repeated blood tests and the removal of the non-reacting animals to clean pastures.

Thirty-four of the 48 states of the Union now have regulations in force governing the inter-state movements of dairy and breeding cattle in connection with the control of abortion disease. Fourteen of these states prohibit the entry of positive reactors to the agglutination test and 18 states require a negative test.

II. This article deals with quarantine regulations for the control of bovine contagious abortion in South Carolina.

III. This is a general discussion on abortion disease and refers in particular to the various inter-state regulations for the control of the disease.

" This record makes it clear that a titer of 1 : 40 is exceedingly common in normal individuals, and that it involves no threat of danger when it occurs in individuals which come from herds in which no higher agglutinations exist, or have recently existed."—T. M. Doyle.

Male, G. P. (1933). **Vaccination against Contagious Abortion in Cattle.**—*Vet. Rec.* **13.** 2-5. [Paper presented to the Midland Counties Division Nat. Vet. Med. Ass. Gt. Britain & Ireland at Rugby, Nov. 10th, 1932].

The author states that, in his experience, live vaccine has proved to be the only effective means of immunization against bovine contagious abortion and that dead vaccine was found to be of little value. He claims good results from vaccination, but the evidence he brings forward is unreliable as it is based mainly on the results obtained in infected herds, many of the animals in which will have acquired a tolerance to the disease as the result of natural infection.

[When Male states that the system of blood testing and segregation for control of the disease is carried out in the hope that it will " wear itself out," it is clear that he has misunderstood the principle involved. This method, which is applicable

only to reasonably self-contained farms, is practised with the object of reducing the cost of eradication by eliminating the disease in a gradual manner and to achieve this end infected animals which are profitable are maintained for variable periods in the farm.

This article consists of a rather biassed defence of live abortion vaccine and it contains many statements concerning the disease and the agglutination test in its application to it which will not meet with general agreement. Live abortion vaccine is probably of value under certain restricted conditions, but its long continued use has not prevented the dissemination of infection, if it has not actually contributed to it, and it will never achieve the eradication of the disease. In view of these facts it is not unreasonable to claim that, in the interests of stock-breeders, other methods of control should be practised where circumstances are favourable to them].—T. M. Doyle.

I. M'Fadyean, J. (1933). **Vaccination Against Contagious Bovine Abortion.** —*J. Comp. Path. & Therap.* **46.** 50-55.

II. —. (1933). **Vaccination against Contagious Bovine Abortion.**—*Lancet.* **224.** 973-974. [2 refs.]

I. The author refers to a paper by Andrews [(1932). *Vet. Rec.* **12.** 1217.] in which it is stated that live abortion vaccine " is of very real economic value and that its use is fully justified unless in some way it causes definite injury."

M'Fadyean believes that the system of vaccination encouraged by the Ministry of Agriculture has had no effect in reducing the number of infected animals in the herds in which it has been practised. The uncontrolled manner in which the vaccine has been used would be unlikely to assist in assessing its value and this view is supported by the lack of precision in the information supplied by practitioners. He points out that the only basis on which the value of vaccination could be estimated is its effect on the abortion rate and the prevention of fresh infection in a herd. This method cannot obviously be employed under the varying conditions which obtain in the field. It provides no basis of comparison, as it is common knowledge that the abortion rate in different infected herds, or in the same herd, varies greatly from year to year.

As regards the effect of vaccination on the spread of infection, the information supplied by practitioners must also be of little value, as clinical methods furnish no data as to the ratio of infected to non-infected animals in herds before and after vaccination. The only reliable method for the evaluation of live vaccine is by large scale experiments in infected herds, in which half the animals would be vaccinated and half kept as controls.

M'Fadyean questions the accuracy of the statement made in support of live vaccine that " if it does no good it does no harm."

> " The evidence collected in this country is very far from proving that no harm has been caused by the inoculation of 25,000 cows and heifers annually during the last 20 years. Wide experience suggests that probably the majority of these animals were healthy at the time of vaccination, and, whatever may be the final result of vaccination, its immediate effect is to cause a 100 per cent. infection of the herd. In unvaccinated herds a blood test seldom shows that half the animals are infected."

[The author's figure of 25,000 refers only to the doses of vaccine issued by the Ministry of Agriculture; live vaccine is also prepared by commercial laboratories in this country and supplies of it are also imported from abroad].

The statement made by some authors that pregnant cows in this country have been inoculated with live vaccine is disturbing, in view of the grave risk of setting up chronic infection in the udder, which cannot be detected by clinical examination,

and the consequent contamination of the milk supply.

When the live vaccine was first introduced in 1914, it was not then known that many animals remained infected for years with *Br. abortus* or that chronic infection of the udder was a common occurrence.

M'Fadyean has formed the definite opinion, based on his long and wide experience, that the use of live abortion vaccine is a bad policy and should be abandoned.

He recommends that the disease should be controlled by blood testing and isolation and if possible that new animals should not be introduced into a herd during the first two years the eradication policy is in progress.

" Grandiose schemes for eradicating the disease are out of the question, and efforts should have regard to the fact that at least for many years to come regulations must have the approval and the assistance of the owners of infected herds. Success will largely depend on the knowledge and intelligence of the veterinary practitioners in agricultural districts throughout the country. They should be encouraged to keep detailed records of the facts in connection with every outbreak, and such records might be collected by the Ministry of Agriculture for critical study and eventual publication."

II. This is a note on the article by M'Fadyean. It is pointed out that bovine contagious abortion has become of considerable interest to the medical profession since it has been shown that *Br. abortus* is occasionally pathogenic for human beings. It is stated that " to the Farmer contagious abortion is a source of greater economic loss than tuberculosis."—T. M. Doyle.

I. —. (1931-1932). Maladie de Bang. Au sujet de sa prémunition par injections de cultures vivantes. [**Immunization against Bovine Contagious Abortion with Live Vaccine**].—*Bull. Soc. Méd. vét. prat. Paris.* **15.** 265-271 and **16.** 11-17 and 82-85.

II. le Neveu. (1932). Emploi du Collargol dans le traitement de l'avortement épizootique. [**The Use of Collargol for the Treatment of Bovine Contagious Abortion**].—*Ibid.* **16.** 146-147.

I. This is a discussion on the value of live vaccine for the control of bovine contagious abortion ; it contains the usual well-known arguments for and against the vaccine.

II. le Neveu claims good results from the subcutaneous injections of 1 per cent. solution of collargol in the treatment of bovine contagious abortion. For various reasons he has discontinued the use of the drug and now uses live vaccine.

—T. M. Doyle.

Smith, J. (1932). **Undulant Fever in the North-East of Scotland.**—*Quart. J. Med.* **25.** 303-317. 5 tables. [42 refs.]

Of 373 specimens of blood from cases of " fever " in human beings, 11 agglutinated *Br. abortus* at 1 : 100 or higher ; 10 were regarded as typical cases of undulant fever, i.e. 0·26 per cent. of all " fevers " examined.

The clinical, bacteriological, and serological findings of these cases are described ; five were in males, aged from 14 to 42 years and five in females aged from 22 to 39 years. It is believed that most of these were due to infected milk.

Of 1,446 Wassermann sera, 66 agglutinated *Br. abortus* at 1 : 25 or higher and 30 agglutinated *Br. melitensis* at 1 : 25 or higher. Of these, eight, all from males, agglutinated *Br. abortus* at 1 : 100 or higher ; three sera, two from farm servants and one from a butcher, had a titre of 1 : 200 or 400. In one of the farm servants (1 : 400) a febrile condition of two months standing was present.

—A. W. Stableforth.

Süpfle, K., & Hofmann, P. (1932). Serologische und bakteriologische Untersuchungen über das Vorkommen von menschlichen Banginfektionen im Freistaat Sachsen. [**Serological and Bacteriological Research on the Occurrence of Brucella Infection in Human Beings in Saxony**].—*Arch. Hyg. Berlin.* **108.** 113-128. 2 tables. [25 refs.]

Of 1,433 blood samples which were received as suspect of salmonella infection and examined with a negative result, 31 (2·1 per cent.) were positive to tests for brucella. Of 164 samples from patients suspect of brucella infection, 30 (18·3 per cent.) were positive. Brucella were cultivated from the blood of 4 out of 37 suspect cases. They were obtained by means of guinea pigs in 5 out of 30 serologically positive blood samples, taken at the height of the fever.

Infection was two and a half times as frequent in males as in females and occurred chiefly between 20 and 30 years of age, the incubation period being from two to six weeks ; three deaths occurred. From data obtained in 28 cases it is concluded that 18 cases were due to contact with infected bovines, four to consumption of infected milk, two to self-inoculation whilst vaccinating cattle, and four to laboratory infection.

Taking a titre of 1 : 100 and 0·02 c.c. as positive for agglutination and complement-fixation tests respectively, 40 per cent. of cases were detected by both tests, 50 per cent. by agglutination only and 10 per cent. by complement-fixation only. Of 55 sera positive by agglutination, 45 reacted with both *Br. melitensis* and *Br. abortus*, 5 with *Br. melitensis* only and 5 with *Br. abortus* only. The authors discuss the reason for the low proportion of cases detected by agglutination only, chief amongst which is the fact that nothing less than complete fixation with 0·02 c.c. of serum could be regarded as positive and the fact that many sera were taken early in the illness.—A. W. Stableforth.

I. Sonnenschein, C. (1932). Auf Leuchtvibrionen wirksame Bacteriophagen. [**Bacteriophages Effective on "Luminous Vibrios"**].—*Zlb. Bakt. I.* (*Orig.*). **126.** 297-302. 3 figs. [7 refs.]

II. Jones, F. S., Little, R. B., & Orcutt, Marion. (1932). **Vibrios from the Intestinal Tract of the Gray Rat.**—*J. Exp. Med.* **55.** 939-944. 3 figs. on 1 plate, 1 table. [1 ref.]

I. The article describes the search for a bacteriophage effective against *Vibrio albensis*, the vibrio which forms luminous colonies. Examination of manure, water and faeces of various animals and birds failed to reveal a phage active against either *Vibrio albensis* or the cholera group of vibrios.

II. Small numbers of rats and mice were examined and vibrios were isolated (the technique being given). By agglutination methods these organisms were shown to differ from vibrio strains claimed to be the cause of infectious diarrhoea of cattle. [See this *Bulletin.* **1.** 207].

The object of the investigation is to seek a reservoir of infection of the bovine vibrio amongst rodents.—E. J. Pullinger.

DISEASES CAUSED BY PROTOZOAN PARASITES.

Eickmann, H., & Karmann, P. (1932). Zur Frage der Bekämpfung der Kokzidiose der Küken. [**The Campaign against Coccidiosis in Chickens**].—*Zschr. Infektkr. Haust.* **43.** 41-58. 6 tables. [27 refs.]

The author describes two experiments the object of which was to compare various methods of treating coccidiosis in chickens. In the first, 44 infected

chickens were divided into four groups and kept apart in boxes under the following conditions :—group I was kept under hygienic conditions where the floor of the cage consisted of thin-meshed wire netting which allowed faeces to pass through while the food was protected from soilage with faeces ; group II was given, instead of water, a special iodine milk mixture ; group III was fed on a cereal mixture of wheat and millet ; group IV was kept as a control. The experiment lasted 32 days, at the end of which time no mortality had taken place in group I and an examination of the faeces of each chick showed that no coccidia were present. In groups II, III, and IV death from coccidiosis occurred in 1, 5 and 3 chicks respectively, and a few in each group were found to be harbouring coccidia. At the end of the experiment, the remaining chicks in each group were weighed and it was found that those in group I showed the maximum average weight, whereas those in group III showed a considerable loss.

In the second experiment, 98 infected chickens were divided into two equal groups, the first being kept under the same hygienic conditions as group I in the first experiment and the second left as a control. After 36 days there was a mortality of 10 per cent. in the first group and one of 20 per cent. in the control. The examination of the faeces of both groups showed the presence of coccidia in a far smaller number of chickens in the first group while the average weight was considerably higher than in the control group. In three infected chickens there developed the typical signs of Marek's fowl paralysis and the author stresses the importance of coccidiosis in producing similar disease symptoms.

In order to determine whether there was any immunity to coccidiosis, six pullets, which as chickens had been infected in the first experiment, were reinfected with the same species of coccidia. One of the six died of coccidiosis, but the other five remained healthy. Whether this immunity resulted from previous infection or was the result of natural age resistance was undecided.

—S. J. Edwards.

Skidmore, L. V., & McGrath, C. B. (1933). **Canine Coccidiosis due to Eimeria canis.**—*J. Amer. Vet. Med. Ass.* **82.** 627-629. [9 refs.]

The authors review the literature on canine coccidiosis and state that there are very few reports of the finding of coccidia belonging to the genus eimeria in dogs. They describe oocysts (the average size of which was $28{\cdot}75 \times 16{\cdot}23\mu$, the wall being $0{\cdot}75$ to $1{\cdot}0\mu$ thick), encountered by them in the faeces of a dog. Faeces containing oocysts were put into a 2 per cent. solution of potassium bichromate and in 19 hours four sporocysts had developed in some of the coccidia. The average size of 15 sporocysts measured was $9{\cdot}35 \times 7{\cdot}26\mu$. The average size of 10 sporozoites measured was $9{\cdot}47 \times 2{\cdot}49\mu$. They believe the coccidia found by them to be *Eimeria canis* Wenyon as described by Wenyon in 1923 and Nieschulz in 1924.—Ll. E. W. Bevan.

Yakimoff, W. L. (1933). Zur Frage der Diagnostik der Kokzidien. [**On the Question of the Differentiation of Coccidia**].—*Zschr. Infektkr. Haust.* **43.** 244-255. 1 table.

This article discusses the points which are relied on for the differentiation of the eimeria and isospora of animals.

The species of animal affected.—Although the coccidia of another animal species may be found in the droppings, e.g. *Eimeria perforans* of the rabbit in fowl faeces, yet these are only specimens which have passed through the intestine and have not undergone development. Coccidia are very specific to their own host.

The size of the oocyst.—There may be considerable variation between

individuals of the same species, but the average size of individuals remains remarkably constant for a given species.

THE SHAPE OF THE OOCYST.—This may be oval, round, pear-shaped, cylindrical, elliptical or oviform.

THE SHAPE INDEX.—The ratio between breadth and length.

COLOUR.—In some species the oocyst is brown or yellow.

THE PRESENCE OR ABSENCE OF A MICROPYLE or a flattening in the place of a micropyle. In some species there is a cap in addition to the micropyle, e.g. *E. faurei.*

THE MEMBRANES OF THE OOCYST WALL.—There may be two or three membranes and in some cases the outer membrane shows elevations or horny projections.

THE SIZE OF THE SPORES OR SPOROZOITES.—Considerable variations occur within a species.

THE PRESENCE OR ABSENCE OF A RESIDUAL BODY.—In some species none can be detected ; in others a residual body may be present in the oocyst, while it is sometimes found both in the oocyst and sporozoites.

THE POLAR GRANULES.—These may be absent or two or three may be present.

THE TIME REQUIRED FOR SPORULATION.—This varies from 21 hours, in the case of *E. acervulina* of the fowl, to 21 days, in the case of *E. smithi* of cattle.

THE TIME FROM INFECTION TO THE APPEARANCE IN THE FAECES.—A table is given of the above particulars for the eimeria of cattle, sheep and goats, swine, rabbits, fowls, turkeys and geese and for the isospora and eimeria of dogs and cats.

—U. F. RICHARDSON.

GINGRICH, W. (1932). **Immunity to Superinfection and Cross-Immunity in Malarial Infections of Birds.**—*J. Prevent. Med.* **6.** 197-246. 16 tables. [34 refs.]

SCHÜFFNER, W. A. P., SWELLENGREBEL, N. H., ANNECKE, S., & DE MEILLON, B. (1932). Vergleichende Untersuchungen über Malaria Immunität in Niederländisch-Indien und Südafrika. [**A Comparison of Investigations on Malarial Immunity in the Dutch East Indies and South Africa**].—*Zlb. Bakt. I.* (*Orig.*). **125.** 1-31. 12 text figs. [32 refs.]

JERMOLJEWA, Z. W., & BUJANOWSKAJA, I. S. (1932). Zur Frage der Malaria-Immunität. [**On the Question of Malarial Immunity**].—*Zschr. Immun.-Forsch.* **73.** 276-278.

The first paper records the results of cross-immunity tests in canaries between various species of malarial parasites. A latent infection of *Plasmodium cathemerium* gave effective immunity against that organism and partial immunity to *P. relictum* and *P. rouxi*, but no immunity against *P. elongatum*. A chronic infection with *P. relictum* was associated with complete immunity to infection with the same parasite, partial immunity to *P. cathemerium* and no immunity to *P. rouxi* or *P. elongatum*. *P. rouxi* infection was relatively non-efficient against reinfection, gave some cross-immunity to *P. cathemerium*, but none to *P. relictum* or *P. elongatum*. A case of complete recovery from infection by *P. elongatum* is recorded, followed by reinfection by the same organism.

The second paper contrasts the reactions of Malay and Bantu populations to malarial infections. In Malays there is a severe reaction to infection followed by control of the parasite. The mortality in children is high, almost all adults have an enlarged spleen and the parasitic index, which is highest at about 14 years of age, decreases in adolescence to 7 to 10 per cent. In Bantus the reaction is mild and recovery is associated with tolerance. Infant mortality is low, there is little enlargement of the spleen and the parasitic index in adults is rarely under 40 per cent.

The third paper discusses malarial immunity in canaries and records attempts to confer immunity with extracts of parasites. Some lengthening of the incubation period was obtained, but no real immunity. The paper discusses the discrepancies in recorded results of treatment with alanin and suggests that specimens of alanin may vary in potency.—U. F. Richardson.

Strickland, C., & Roy, D. N. (1932). **The Behaviour of Plasmodia in the Mosquito after Treatment of the Human Host with Atebrin.**—*Ind. Med. Gaz.* **67.** 191-192. 3 tables.

Specimens of *Anopheles stephensi* were fed on a human being after treatment with " atebrin " (three doses of 0·1 g. for four days) and 21 to 24 days after feeding a search was made for developmental forms in the mosquitoes. The authors conclude that " atebrin " inhibits the development of gametocytes in the mosquito, but that the parasite recovers its developmental power about three days after the drug is discontinued.—U. F. Richardson.

I. Livierato, S., Vagliano, M., & Constantakato, G. (1932). Utilisation d'un nouvel antigène pour le diagnostic de la malaria par la méthode de floculation. [**The Use of a New Antigen for the Diagnosis of Malaria by the Flocculation Method**].—*C. R. Soc. Biol. Paris.* **110.** 26-27.

II. Chorine, V. (1932). Un nouveau traitement du sang en gouttes épaisses pour la recherche des parasites du paludisme. [**A New Treatment of Thick Drop Preparations for the Detection of Malarial Parasites**].—*Bull. Soc. Path. exot.* **25.** 561-563.

III. Sinton, J. A., & Mulligan, H. W. (1932). **Note on an Intradermal Reaction in Monkey Malaria.**—*Ind. J. Med. Res.* **20.** 581-583. 1 table. [1 ref.]

I. Henry showed that the serum of malarial patients gave a flocculation reaction in the presence of an antigen made from the chorion and liquid part of the eye of an ox. It was thought that the active antigen in this reaction was melanin and to test this the authors used the melanin of the cuttle fish. The pigment sac of a cuttle fish was cut in small pieces, macerated in 1 : 2,000 formol solution, the supernatant fluid removed and kept on ice for two months before use. This antigen gave positive results when tested with the serum of malarial patients and negative results when tested with the serum of eight uninfected controls.

II. The following method is recommended for the treatment of thick blood preparations for examination for malarial parasites :—dry at low temperatures ; place in 10 per cent. formalin for 3 to 15 minutes ; wash in water ; place in iodine solution for 3 to 5 minutes ; wash ; place in 5 per cent. hyposulphite of soda for 3 to 5 minutes ; wash and stain. It is claimed that the 10 per cent. formalin both fixes and haemolyses and that the resulting specimen is clearer and less distorted than if water had been used for haemolysis.

III. Various antigens were prepared from the blood and organs of monkeys infected with malaria and injected intradermally into other monkeys. The most satisfactory results were given by an antigen prepared by digesting with papain a suspension of malarial parasites washed free from haemoglobin. In normal monkeys the reaction was a large circumscribed swelling which had distinctly faded in three to four hours. In infected monkeys the reaction appeared more slowly, but later became more marked and reached its maximum after 24 hours with marked oedema and usually some necrosis. Tests were carried out in 13 infected monkeys and 9 controls.—U. F. Richardson.

I. Cowdry, E. V., & Ham, A. W. (1932). **Studies on East Coast Fever. I. The Life Cycle of the Parasite in Ticks.**—*Parasitology.* **24.** 1-49. 1 text fig., 69 figs. on 7 plates, 5 tables. [32 refs.]

II. Cowdry, E. V., & Danks, W. B. C. (1933). **Studies on East Coast Fever. II. Behaviour of the Parasite and the Development of Distinctive Lesions in Susceptible Animals.**—*Ibid.* **25.** 1-63. 97 figs. on 10 plates, 8 tables, 2 diagrams, 4 charts. [78 refs.]

I. For work on the life cycle of the parasite in ticks, nymphs or adults were collected and the larvae or nymphs raised from them were used for experiment. As *Theileria parva* does not pass through the egg the larvae were free from piroplasms. Control larvae and nymphs were fed on clean calves and examined after engorgement, but the results of the examination of these are not recorded.

The larvae and nymphs used for experiment were fed on calves suffering from East Coast fever and were examined by serial section, smears and dark ground illumination. To remove the chitinous covering for serial section work, the ticks were pressed into melted paraffin, leaving the dorsal surface exposed. They were then covered with physiological saline and the dorsal chitin removed by the use of a small iridectomy knife and a special curved knife to sever tissue attachments. The soft parts were then freed from the ventral chitin by the curved knife which allowed the entire contents of the tick to float out. Previous to staining with Giemsa, sections were treated for 30 seconds with 1 per cent. potassium permanganate and then abstracted with 5 per cent. oxalic acid for 30 seconds, a process which intensified the blue colour of the Giemsa stain.

Three complicating parasites were encountered which, however, could be distinguished from the piroplasms by their morphology, position in the tick, or reaction to the stain.

The life cycle described is briefly that, after ingestion by the tick, the blood corpuscles contain parasites of many shapes and sizes. Some are small and possess a nucleus which stains deeply and is about as large as the cytoplasm. Others are larger and contain nuclei which stain less intensely and are embedded in a larger proportion of cytoplasm. After escape from the corpuscles, large and small parasites can be distinguished and there is a marked tendency for each to be associated in clumps.

The large and small parasites become applied to the surface of the epithelial cells and the authors consider that it is probable that fertilization takes place, but they could not obtain convincing evidence on this point. The parasites enter the cells, the small forms disappear whilst the large forms give rise to a stage without distinct nuclei which the authors refer to as a " zygote," in spite of their inability to obtain evidence of conjugation. The " zygotes " increase in size, nuclei reappear within them and some of them exhibit a central concentration of material and an accentuation of the limiting membrane. They gradually assume the form of a large nucleated organism, the ookinete, which begins to appear the day previous to moulting. The ookinetes make their way into the body cavity and enter the cells of the salivary glands, where they round up and the nucleus disappears. Further growth takes place, they become distended and buds appear at the periphery, later becoming more distinct and exhibiting irregular masses of chromatin within their interior. These forms are regarded as sporonts and sporoblasts and give rise to sporozoites, many of which become detached.

The sporozoites, which appear about the third day after the tick becomes attached to a new host, are very small, and consist of a slightly elongated mass of blue staining cytoplasm, in one extremity of which is situated a deeply red staining nucleus. They closely resemble the small forms of the red blood corpuscles and

are discharged into the lumen of the salivary gland acinus.

The description varies from that of GONDER in that no conjugation was detected and that GONDER did not describe stages corresponding with the zygote, sporont or sporoblasts whilst his ookinete stage is very different to that described by the authors.

Ticks from the series used for examination were fed on susceptible calves and produced East Coast fever except in one case when the animal developed a *Th. mutans* infection and died before the East Coast fever infection had time to appear.

II. The second paper records investigations to attempt to follow the behaviour of the parasite in the susceptible animal and its effect on the cells and organs of the animal.

The medium sized lymphocytes are the principal cells parasitized by Koch's bodies, but they are also found in lymphoblasts, large and small lymphocytes and occasionally in parenchymatous liver cells. Forms containing a mixed infection of agamonts and gamonts are recorded. The first agamonts were noted on the day the fever first exceeded 103°F. ; the gamonts appeared about a day later and the intra-erythrocytic forms soon after. A record is made of the changes caused by the parasites which, apparently, dominantly relate to the lymphatic system and the distribution of Koch's bodies. The evidence presented does not support the conception that the parasites serve as a stimulus to the multiplication of lymphocytes. The enlargement of the lymph glands appears to be mainly due to oedema. The number of lymphocytes is reduced in the lymph glands and peripheral blood, but is increased in the blood vessels of the liver. Small haemorrhages constitute a second alteration of importance and are particularly prone to occur in the epicardium and endocardium. The authors accept STECK'S interpretation of the " white foci " of the kidneys, that they are rapidly proliferating lymph follicles. They recognize three principal groups of parasites in the blood, small spherical-oval parasites, tailed parasites and plump forms. They question the validity of the genera into which the family of Theileriidae is customarily divided and point out that the size of the parasite may be governed, to some extent, by the reaction of the host. Suggestions are made as to the lines which therapeutic investigations might follow.—U. F. RICHARDSON.

PARROT, L., DONATIEN, A., & LESTOQUARD, F. (1932). L'Etiologie des Leishmanioses. [**The Aetiology of Leishmaniases**].—*Algérie Méd.* **36.** 139-171. 6 figs., 2 plates. [139 refs.]

This article is a critical review of known facts in regard to leishmaniasis and discusses the theories put forward on the relationship between the various clinical forms and on the methods of transmission. The authors consider that kala-azar, Mediterranean splenic leishmaniasis and canine visceral leishmaniasis are due to the same " virus," or closely related viruses, which may be classed as *Leishmania donovani*. Although the canine and human diseases do not always show parallel prevalence in affected districts and, although the slaughter of dogs has not always led to a decrease of the human disease, yet a possible explanation may be found in varying local factors governing transmission which may be responsible for the relative freedom from disease of the local human or canine populations.

As regards the differentiation of *L. donovani* and *L. tropica*, the causal organism of cutaneous leishmaniasis, it is said that the former, when inoculated intradermally into dogs, produces a fibrous nodule with no tendency to ulceration, whilst the latter produces lesions which pass through the stages of papule and nodule to definite

ulceration. *L. tropica* also causes local lesions in white mice and retains its virulence with passage in mice, whilst *L. donovani* does not produce local lesions and becomes attenuated with passage. Whilst infection with *L. tropica* does not appear to immunize against *L. donovani*, yet recovery from kala-azar does immunize against oriental sore.

The question of transmission is fully discussed and, in oriental sore, the case for transmission by *Phlebotomus papatasi* is championed though it is admitted that, except for one doubtful case, it has been impossible to effect transmission experimentally by the bite of this insect. In the case of visceral leishmaniasis, it has been proved that the virus will survive in *Rhipicephalus sanguineus* and will pass from the larva to the nymph and the adult, but preference is given to the probability of transmission by *Phlebotomus* in which the parasites assume the leptomonas form.

The authors consider that, in North Africa, the dog cannot be blamed as a reservoir of the virus, as canine cutaneous leishmaniasis is rare; they suggest that *Leishmania* may be normally a parasite of insects.—U. F. RICHARDSON.

HEGNER, R. (1932). **Differential Reactions of Species and Strains of Trichomonad Flagellates to Changes in the Environment.**—*Amer. J. Hyg.* **16.** 513-522. [1 ref.]

SIMIC, T. (1932). Etude complémentaire de l'infection du chien par le *Trichomonas* d'origine humaine, canine et féline. [**Additional Studies of the Infection of Dogs by Trichomonads from Human, Canine and Feline Sources**].—*Ann. Parasitol.* **10.** 402-406. [1 ref.]

The first paper deals with the reactions of *Trichomonas hominis* and *T. buccalis* of human beings and *T. parva* of the rat to varying temperatures of cultivation and also with their powers of ingesting the red corpuscles of different species of mammals and their power of ingesting starch grains. The results indicate that strains of trichomonads from the same host species may differ from each other more than they differ from strains from another host species.

The second paper records experiments to ascertain whether the immunity of adult dogs to trichomonad infection is acquired by a previous attack in puppyhood or whether the immune state is an attribute of age. Dogs under two months old were infected *per os* and died, whilst dogs between two and three months old became infected but recovered; adult dogs from the same area as the susceptible puppies were immune. As younger dogs are more severely affected than older animals, the author thinks that immunity is acquired with increasing age. He considers that on biological grounds *T. intestinalis* of man must be considered as the same species as the trichomonads of the cat and the dog.

—U. F. RICHARDSON.

—. (1933). **Trypanosomiasis amongst Army Animals in the Philippine Islands.** —*Vet. Bull. U.S. Army.* **27.** 9-15. [Copy of a Report from the Department Veterinarian, Philippine Department, to the Surgeon General, U.S. Army].

Following an extensive outbreak of surra in 1929, the routine temperature taking of animals was continued as a precautionary measure. Towards the end of 1931 numerous cases of pyrexia of a peculiar type occurred among horses and mules. The temperature remained elevated at between 104° and 105°F. for three or four days, after which it receded to normal and the affected animals appeared to regain their usual health.

The possibility of the pyrexia being a manifestation of trypanosomiasis was considered, but all attempts to demonstrate trypanosomes in the blood failed as did also blood inoculations to rats and mice.

Some 280 samples of blood serum taken from affected and also from apparently healthy horses and mules were subjected to the complement-fixation test, a *Trypanosoma evansi* antigen being employed. Eighteen of these tests were reported as positive and 22 as suspicious. Nevertheless there was no other evidence forthcoming that the malady being dealt with was surra. The theory is advanced that the ingestion by horses and mules of forage soiled by the excreta of rats infected with trypanosomes may result in the formation of antibodies and thus be responsible for the positive and suspicious reactions to the complement-fixation test.

—A. A. Pryer.

Scheff, G. (1932). Ueber den intermediären Stoffwechsel der mit Trypanosomen infizierten Meerschweinchen. [**On the Intermediate Metabolism occurring in Guinea Pigs infected by Trypanosomes**].—*Biochem. Zschr.* **248.** 168-180. 7 tables. [10 refs.]

This article records the results of experiments on the sugar and fat contents of the blood and liver of guinea pigs infected by *Trypanosoma equiperdum*. Glucose and sorbite were administered to normal and infected guinea pigs and the effect on the blood sugar content recorded. In normal guinea pigs the administration of glucose gave a blood content curve in which the maximum was reached in 30 minutes, whilst in infected animals the maximum was not reached for 45 to 60 minutes. In normal animals, sorbite did not alter the blood sugar content, but in infected animals a rise in blood sugar occurred. In infected animals treated with germanin, which caused a rapid disappearance of trypanosomes, the blood sugar content rapidly rose until it exceeded the normal. The decrease of glycogen and the increase of fat in the liver may be considered as due to functional insufficiency. The authors conclude that the hypoglycaemia is due to the trypanosomes and is not a purely agonal reaction.—U. F. Richardson.

I. Nattan-Larrier, L., & Noyer, B. (1932). Evolution des Trypanosomes du Hamster dans les cultures. [**The Development of the Trypanosomes of the Hamster in Cultures**].—*C. R. Soc. Biol. Paris.* **110.** 772-776. [2 refs.]

II. Noyer, B. (1932). Sur un Trypanosome de *Quelea quelea*. [**A Trypanosome of *Quelea quelea***].—*Ibid.* 1240-1241.

I. 80 per cent. of hamsters showed trypanosomes on direct blood examination and, in the remaining 20 per cent., infection was demonstrated by blood culture. The trypanosome resembled *T. rabinowitschi* Brumpt, 1906. The development in culture resembled that of *T. lewisi* and commenced in ten days.

II. Four specimens of *Quelea quelea*, a bird of tropical Africa [sometimes known as the Brazilian sparrow], were examined for trypanosomes and, in one bird, cultures on rabbit's blood agar showed rare specimens of a small rapidly moving trypanosome with a short free flagellum. The average length was 15μ and the width across the nucleus, which occupied the whole breadth of the organism, was 1·8μ. Rosette forms were also encountered. The trypanosome differed from other trypanosomes of birds in that it was monomorphic in cultures and no leptomonad forms appeared.—U. F. Richardson.

Jettmar, H. M. (1932). Studien über Blutparasiten ostasiatischer wilder Nagetiere. [**Studies on the Blood Parasites of the Wild Rodents of Eastern Asia**].—*Zschr. Parasitenk.* **4.** 254-284. 4 text figs., 7 figs. on 1 plate, 2 tables, 1 graph. [13 refs.]

This article records observations made on the blood of wild rodents in connection with plague investigations in Manchuria and Mongolia.

Grahamella infection was encountered in spring hares, hamsters and voles. Trypanosomes were detected in hamsters and field mice, two varieties being encountered. *Hepatozoon* was found in 100 per cent. of spring hares. *Bartonella* was studied in the mice species after splenectomy, three varieties being recorded. *Grahamella* was grown in culture on blood-serum-agar and infection was produced by intracardial inoculation of cultures.—U. F. Richardson.

I. Chorine, V., & Prudhomme, R. (1933). Seuil de résistance des Spirochètes des Poules à l'acidification des milieux de culture. [**Threshold of Resistance of Fowl Spirochaetes to the Acidification of the Culture Medium**].—*C. R. Soc. Biol. Paris.* **112.** 839-840. 1 chart. [1 ref.]

II. Chorine, V. (1933). La séroflocculation de Henry dans la spirochétose des Poules. [**Henry's Seroflocculation Reaction in Fowl Spirochaetosis**].—*Ibid.* 1164-1165. [2 refs.]

I. Subcultures can be made from pure cultures of fowl spirochaetes, when in a suitable medium under paraffin seal, up to the 14th or 15th day. When the cultures are contaminated with "*Bacillus*" *eucarians*, the spirochaetes die about the fourth or fifth day. The authors arranged an experiment to determine if this difference was due to a more rapid increase in the acidity in the contaminated cultures.

Three series of tubes, containing respectively medium and normal fowl blood, medium inoculated with *Spirochaeta gallinarum*, and medium inoculated with spirochaetes and "*Bacillus*" *eucarians*, were prepared. They were incubated for 20 days and every day the pH was determined by means of a capillary electrometer apparatus.

At the commencement the pH of all the tubes was 8·3. Acidity developed most rapidly in the cultures containing "*Bacillus*" *eucarians*, the pH of which reached 6·5 between the fourth and fifth day. In pure spirochaete cultures this figure was not reached until the 14th day. The authors consider that the spirochaete can only survive in media the pH of which is greater than 6·5.

II. Henry's seroflocculation reaction was tried on the sera of normal fowls and on the sera of fowls infected with *Spirochaeta gallinarum*. Six normal fowls gave no flocculation.

Infected fowls also gave no flocculation while the febrile reaction lasted and while parasites persisted in the blood. Five or six days after spirochaetes disappeared from the blood, the sera became positive and continued to give flocculation for 30 to 50 days.

Sections of liver and spleen of birds, a week or two after recovery, showed that both hepatic and endothelial cells of the former and some cells of the latter contained pigment granules which, on the application of potassium ferrocyanide and hydrochloric acid, gave a Prussian blue reaction. It would appear, therefore, that the parasite causes considerable breakdown of red cells.—J. R. Hudson.

Yakimoff, W. L., Polionoff, M. K., & Rastegaieff, E. F. (1932). Die Spirochätose der Hühner in Azerbaidschan (Transkaukasien). [**Fowl Spirochaetosis in Azerbaijan (Trans-Caucasia)**].—*Zschr. Immun.-Forsch.* **75.** 355-362. 1 table. [36 refs.]

Stylianopoulos, M. (1933). Transmission expérimentale de la spirochétose des Poules au Pigeon et au Lapin. Persistance du virus dans le cerveau de ces animaux. [**The Experimental Transmission of Spirochaetosis from Fowls to Pigeons and Rabbits. The Persistence of the Virus in the Brain of these Animals**].—*C. R. Soc. Biol. Paris.* **112.** 421-423.

The first paper records investigations into fowl spirochaetosis in Transcaucasia, which, it had been suggested, was due to an atypical virus. As the result of cross-immunity tests, the authors conclude that the spirochaete is identical with *Spirochaeta gallinarum* of Saratow and Brazil. Ducks and geese were susceptible to the spirochaete, but pigeons could not be infected either by inoculation or by ticks.

The relationship between the spirochaetes of fowls, ducks and geese is discussed and a few experiments on treatment are recorded, " arrhenal " being used successfully in one case.

The second paper records the inoculation with fowl spirochaetosis of rabbits and of pigeons, from cots free from *Argas persicus*. In pigeons a rise of temperature occurred 24 hours after inoculation, the spirochaetes appearing in the peripheral blood a little before the rise of temperature and persisting from two to three days. With a second passage through pigeons, an increased virulence for pigeons developed, but no decreased virulence for fowls. By subinoculation into fowls, it was shown that spirochaetes persist in the brain of pigeons after their disappearance from the peripheral blood.

After intramuscular or intraperitoneal injection in rabbits, rare spirochaetes appeared in the peripheral blood, whilst with intra-testicular inoculation, a scrotal and perineal reaction occurred. Passage through rabbits did not appear to modify the virulence of the spirochaete for fowls.—U. F. Richardson.

DISEASES CAUSED BY VIRUSES.

Goodpasture, E. W. (1933). **Cytotropic Viruses, with References to Filterable Forms of Bacteria and Cancer.**—*Amer. J. Hyg.* **17.** 154-167. [21 refs.]

This article is a critical survey of the filtrable viruses. The author draws attention to the confusion which exists between two groups of infective agents, i.e. the pathogenic bacteria with a filtrable phase and the so-called " filtrable viruses." He deplores the tendency of certain bacteriologists to connect the filtrable forms of bacteria with virus diseases. He suggests that investigators should recognize four main groups :—(1) filtrable forms of bacteria ; (2) filtrable bacteria (pleuropneumonia) ; (3) filtrable viruses separable from the host cells and only recognizable by their ability to reproduce a characteristic disease entity and (4) " cytotropic viruses " separable from the host cells, but at present recognizable by their ability to produce destructive lesions in certain cells of the host.

The exact nature of the viruses is as yet undecided since no member of the group has been indubitably cultivated in the absence of living cells and no morphological forms have been discovered which conclusively stamp these agents as microbic in nature.—R. E. Glover.

Seibel. (1933). Beitrag zur Kenntnis des ansteckenden Blutarmut. [**A Contribution on [Equine] Infectious Anaemia**].—*Berl. tierärztl. Wschr.* **49.** 85.

In a short article the writer draws attention to the clinical similarity of the early stages of equine myoglobinuria to the peracute form of infectious anaemia. The former first shows up at the beginning of work and infectious anaemia at the end of a hard spell. In the former, the rise in temperature is slight, spasm and swelling of the croup muscles is marked, typical haemoglobinuria is seen and the appetite is not seriously altered. In infectious anaemia the temperature is high, muscular spasms and haemoglobinuria are absent and inappetence is apparent. The course of peracute infectious anaemia is very rapid and in this respect as

well as in the *post-mortem* appearances it resembles acute anthrax.

—E. J. Pullinger.

Curasson, G. [Inspecteur général des services vétérinaires des Colonies]. (1932). La peste bovine. [**Rinderpest**]. pp. 334. [42 pages of refs.] Paris : Vigot Frères. [8vo.] [Fr. 40].

This book, by an author who has practical experience of rinderpest in Europe, Asia and Africa, gives a very complete picture of the modern view of the disease in all its aspects. Copious references are made to the writings of other authorities and, on points of dispute, the evidence of both sides is fully quoted, the author then giving an opinion based on his own experience. One is not prepared to accept all the conclusions reached, notably that there is no fixation of the virus after repeated subpassages at a laboratory, and that there is no necessity for a second virus injection after serum-virus inoculation, as any animals which do not react to the first inoculation must be immune. Many field observers consider that the most serious losses encountered in attempts to immunize by the serum-virus method are due to the failure of a large or small number of individuals to react to the virus which therefore confers no immunity. The author's opinion is probably based on the behaviour of a laboratory virus which, if used fresh, rarely fails to provoke a reaction in a susceptible animal.

An atypical form of the disease is described with intermittent fever and a persistence of virus as long as 47 days. It is suggested that this is a form which occurs in partially immune animals, but it is doubtful if this will entirely explain the condition.

The chapter on the history of the disease, susceptible animals and epizootiology is particularly interesting and the discussion of the susceptibility of various species of game is most important to countries in which game is numerous.

On the subject of diagnosis, attention is drawn to the early lesions of the vulva and vagina and to the flocculation test of Daubney with the serum of the suspected animal and an alcoholic extract of spleen pulp to which cholesterin is added.

The important question of virus carriers is discussed and it is concluded that they may exist, but are probably rare.

The methods of preparing sera and vaccines are discussed very fully and the conditions which govern the method of immunization which should be adopted.

—U. F. Richardson.

Jacotot, H. (1932). Etudes sur la Peste Bovine. I. Recherches sur le virus de la peste bovine et sur l'infection qu'il détermine. II. Sur le Sérum antipestique. III. Sur la vaccination antipestique par les extraits avirulents de pulpes organiques. [**Studies on Rinderpest. I. Research on Rinderpest Virus and the Infection caused by it. II. On Anti-Rinderpest Serum. III. Anti-Rinderpest Vaccination by Avirulent Extracts of the Organ Tissues**].—*Ann. Inst. Pasteur.* **48.** 377-399, 648-675 and 744-783. 2 tables, 7 charts. [4 refs.]

This work is very comprehensive and detailed and should be studied in the original by those working on rinderpest research and control.

Studies on the Virus.

Conservation of the Virus Outside the Body.—When the bactericidal action of blood from infected calves was reduced by lowering its pH, it was found in three cases that the virus was still potent after the blood had been stored for one month at 30°C. in darkness.

Peritoneal washing obtained by introducing 3 l. of formolized serum intraperitoneally and withdrawing it after seven days, was virulent after storage for 18 days at 10°C. In a control experiment when physiological saline was used instead of serum, virus did not survive. Spleen pulp and thymus pulp removed from an infected calf and kept at 0°C. were still virulent seven months later and four and a half months later respectively.

Virus remained alive in desiccated spleen pulp kept at 0°C. for five months, but in similar pulp kept at 30°C. it was dead after a few days.

Unicity or Plurality of Rinderpest Virus.—Virus strains from four widely separated areas were tested for virulence on calves and were also tested by cross immunization. The results suggested that no plurality of rinderpest virus exists.

Virus Content of Various Tissues of Infected Animals.—The incomplete work of the author indicates that in calves the abomasal mucosa is most virulent (300,000 units per g.): the other muscosae, blood, spleen, lung, lymph glands and thymus are less virulent (50,000 units per g.); blood, however, may vary considerably (25,000 to 75,000 units per g.).

Studies on Rinderpest Infection.

Carriers of Infection.—The author describes fully three of six experiments designed to ascertain if virus is excreted by animals which have recovered from infection. In no case was any positive evidence obtained, though he agrees that there is a possibility that on rare occasions a recovered animal may remain a carrier.

Occult Rinderpest.—Cases of infection not showing the common clinical picture are not uncommon. This is illustrated by experiments on two goats (unvaccinated) and on two calves previously vaccinated. This fact is of significance in epidemiology.

Susceptibility of Rabbits to Rinderpest.—In six out of eight rabbits inoculated subcutaneously with virulent calf blood, potent virus was obtainable after five to six days: the rabbits showed practically no illness. The infection could not be transmitted over more than three passages in rabbits.

Rinderpest Antiserum.

This is discussed under three headings:—(1) the value of the individual donor; (2) the preliminary treatment of the donor and (3) the sensitivity of the receptor: these all have an important bearing on successful passive immunization. Several experiments to find out the potency of antiserum prepared by different methods were performed, as follows:—(1) serum of convalescents; (2) serum from animals recovered some months previously; (3) serum from animals reinfected when convalescent; (4) as (3) but taken some months later; (5) serum from animals hyperimmunized by (a) spleen pulp or blood, (b) spleen pulp and blood simultaneously, (c) peritoneal lavage and spleen pulp or convalescent serum and (d) spleen pulp and blood or peritoneal lavage.

Of the samples prepared in experiments (1) to (4), serum from (4) was most potent. The serum from (1) was more potent than that from (2) and the procedure of (3) did not raise the potency appreciably. With regard to (5), all methods gave a good antiserum, but it was not easy to discriminate between the results of the various tests.

Further, the potency of antiserum from eight serum cattle, all similarly treated, was tested comparatively on calves and great variation in the value of the serum from each animal was found.

In an additional experiment lung tissue was tested as a hyperimmunizing agent together with blood and spleen pulp. Animals so treated produced a highly

potent antiserum superior to that obtained from cattle hyperimmunized by blood with or without peritoneal fluid.

Virulence of Blood, Pulp or Organs and Peritoneal Fluid.—Titration experiments by animal inoculation showed that blood and spleen pulp were equally virulent, that lung tissue is less virulent and peritoneal fluid still less virulent.

Observations on Serum-Virus Simultaneous Inoculation.—Observations were made on many pregnant cows immunized by the serum-simultaneous virus method. Still-births and non-viable calves totalled 25 per cent. and abortions 14 per cent.

Tests were made to find whether rinderpest virus is present in calf foetuses and in the vaginal fluids. Virus was found in 2 out of 17 aborted foetuses and in the discharge from the vagina of one out of three aborting cows.

Immunological State of Calves Born of Immune Cows.—Observations on 47 calves born of cows immunized during gestation showed them to be fully susceptible to infection at the age of one year. The same applies to the calves of cows immunized before gestation. Such calves are, however, insusceptible to the rinderpest virus up to their third month and they cannot be immunized by serum-virus simultaneous inoculation prior to weaning.

Duration of Immunity following Serum-Virus Simultaneous Inoculation.—The author's observations indicate that immunity once acquired is probably life-long. The mechanism of immunization is fundamentally the same after natural infection or serum-virus simultaneous inoculation, but in the latter case the severity of the reaction is minimized.

Vaccination by Pulp of Organs.

Jacotot reviews the literature and discusses the principle and nature of organ vaccines against rinderpest. On the practical side the author has had better results with sodium fluoride and toluene than with formol, chloroform or phenol vaccines. [The variations in methods of vaccine preparations are too numerous to give here].

Posology of Vaccination.—The dosages of vaccine recommended for cattle, buffaloes, goats and pigs are given in proportion to body weight. Buffaloes require 4 or 5 and goats 3 times the dose necessary to immunize cattle, but the dose for swine is the same as that for cattle.

After artificial infection, cattle are immune from the fourth to the eighth day and can be placed in contact with infected animals three or four days after vaccination. The period for the development of immunity following vaccination depends on the type, amount, etc., of vaccine employed.

The article is concluded by a discussion of several practical points about vaccination in the field. The author finally recommends repeated reinfection to strengthen the degree of immunity conferred in the first place by serum-virus simultaneous vaccination. He describes the method of preparation of his toluene or formol vaccine. Toluene is preferred, but formol is more suitable when a vaccine has to be prepared quickly. The organ pulp is obtained from the lymph glands, tonsils, thymus, thyroids, spleen and lungs of infected cattle.

In Indo-China 200,000 cattle have been vaccinated with satisfactory results.

—J. E.

Rabatel, J. (1932). La lutte contre la Peste bovine au Dahomey. **[The Control of Rinderpest in Dahomey. Part III]**.—*Rec. Méd. vét. exot.* **5.** 65-75.

Parts I and II of this series of articles have been previously referred to in this *Bulletin*. **2.** 80.

The present article is a character study of the different pastoral tribes inhabiting

Dahomey and is only of interest to veterinarians stationed in French African Colonies.—T. M. Doyle.

Klarenbeek, A., & Voet, J. (1932). Verdere Proeven bij experimenteele Pokken. [**Experiments with Artificial Fowl Pox**].—*Tijdschr. Diergeneesk.* **59.** 1226-1227. [1 ref.] [Summaries in English, French and German : abst. from orig.]

The authors carried out experiments in order to ascertain whether prophylactic or therapeutic administration of formol, naganol and stovarsol exerted a favourable effect on the development of local fowl pox eruptions in fowls artificially infected with fowl pox virus. The results were negative.

—B. J. C. te Hennepe (Rotterdam).

Behrens, C. A., & Morgan, L. B. (1932). **Purification of the Virus of Vaccinia.** —*J. Infect. Dis.* **50.** 277-280. 4 tables. [12 refs.]

The authors carried out experiments with the object of finding an improved method for the purification of vaccinia virus.

Two methods, based on colloidal chemical principles, were tried : these were (1) iso-electric method and (2) aluminium gel method.

Neuro-virus was used because of the ease with which it can be obtained free from contaminating organisms.

Both methods were found to be satisfactory for the purification of neuro-virus suspensions, but only the aluminium gel method was applicable to dermo-virus suspensions.—T. M. Doyle.

Thompson, R., & Buchbinder, L. (1932). **Variations in the Encephalitogenic Power of Vaccinia Virus.**—*J. Immunol.* **22.** 267-275. 1 table. [13 refs.]

In this paper the reactions of several strains of vaccinia virus are described with special reference to their powers of producing cerebral lesions. It has been suggested that neurovaccines may owe their neurotropic properties to a contamination with an unrelated virus. The authors consider, however, that the encephalitis-producing power of certain strains is probably a property of vaccine virus itself since rabbits immunized with a dermal strain were completely protected against strains which were highly neurotropic : this suggests that the latter did not contain a second virus capable of inducing an encephalitis in the rabbit.

They have also confirmed a previous observation that the Noguchi testicular virus is unable to produce an encephalitis, whereas the alternate brain and testicle passage of a skin strain, as shown by Levaditi, may produce a neurotropic virus. They believe, however, that the presence or absence of this property in various strains of vaccinia is not dependent upon their origin since they found that derivants of the same parent strain differed in this respect.—R. E. Glover.

Balozet, L. (1932). Multiplication du virus vaccinal sous la peau des génisses. [**The Subcutaneous Propagation of Vaccinia in the Calf**].—*Arch. Inst. Pasteur, Tunis.* **21.** 287-289. [2 refs.]

The author has attempted without success to obtain a multiplication of vaccine virus according to the method of Borrel for sheep pox. A calf received a subcutaneous injection of a bacteria-free, virus-rich pulp (80 g. in 2·5 l. of normal saline solution) and was killed five days later. The local reaction had then almost entirely disappeared and the tissues at the site of inoculation were practically devoid of virus.—R. E. Glover.

I. Jezic, J. A. (1932). Konnen durch Virusverdünning die hauptsächlichsten Nachteile der Klavelisation vermieden werden? [**Can Dilution of the Virus lessen the Chief Disadvantages of Sheep Pox Vaccination?**]—*Zschr. Immun.-Forsch.* **75.** 468-470. [4 refs.]

II. Bridré, J. (1932). Expériences sur la Clavelée. Virus et sérums. [**Investigations on Sheep Pox. Virus and Serum**].—*Bull. Acad. vét. France.* **5.** 386-388. [3 refs.]

I. Experience is said to show that by diluting sheep pox virus instead of vaccinating with undiluted material the following results are achieved :—the serious local reaction is replaced by a mild one ; there are no serious generalized symptoms ; the chance of spread of infection due to the vaccination is decreased. Furthermore, dilution of the material lessens the expense of wholesale treatment. The immunity obtained is said to be satisfactory. No experiments are described and the methods of dilution and standardization of the diluted virus are not given.

II. Difficulty may be encountered in the preparation of antivirus serum when using new strains of virus owing to the high degree of virulence of the infection. Rapid passage of the virus through four or five lambs serves to lower the virulence sufficiently. To prepare a potent antiserum it is advisable to use several strains of virus and the efficiency of the resulting serum should be estimated by titrating against several strains of virus of equivalent strength.

—E. J. Pullinger.

Rivers, T. M., & Ward, S. M. (1933). **Further Observations on the Cultivation of Vaccine Virus in Lifeless Media.**—*J. Exp. Med.* **57.** 741-750. 6 tables, 1 plate. [6 refs.]

The object of this investigation was to confirm the observations of Eagles and Kordi that it was possible to obtain growth of vaccine virus in a medium consisting of a mixture of Tyrode's solution, rabbit serum and an extract prepared from rabbit kidney tissue by means of a hypertonic salt solution and freezing.

Rivers and Ward in their experiments used two strains of vaccine virus (one a dermal strain and the other the Levaditi neurovaccine virus) and supplemented the work by using in addition extracts of rabbit testicles and chick embryos.

Ten attempts were made to cultivate the virus in renal, testicular and chick embryo extracts using two strains, but in no instance was any evidence found of multiplication, although both strains multiplied in media containing bits of minced viable tissue.

Rivers and Ward state that the method of preparation of the tissue extracts described by Eagles and Kordi leaves some cells alive and capable of proliferation.

—T. M. Doyle.

Neitz, W. O., & Marais, I. P. (1932). **Rabies as it occurs in the Union of South Africa.**—*18th Rep. Direct. Vet. Serv. & Anim. Indust. Union of S. Africa.* Part I. pp. 71-98. 6 figs., 5 tables, 6 maps. [32 refs.]

In a historical summary, outbreaks are recorded from 1772 onwards including serious ones involving dogs in 1862 and in 1892. Control measures appeared to be successful on each occasion. In human beings cases have been diagnosed clinically from time to time without laboratory confirmation.

The present outbreak commenced in 1928. The following cases were confirmed histologically and by animal inoculation whilst further doubtful cases were recorded :—between November, 1928, and September, 1931, seven cases occurred in human beings, three in dogs, nine in farm animals and 15 in members of the Viverridae family. The species were *Cynictis penicillata* (yellow mongoose),

Genetta felina (genet cat), *Suricata suricatta* (meercat), *Myonax pulverulentus* (grey mongoose), *Myonax cauui* (red mongoose). This is the only family of wild animals known to show natural infection.

In addition to the usual control measures in infected areas, an attempt is made to decrease the Viverridae population by cyaniding the burrows.

The authors discuss the question of the origin of rabies in South Africa. They incline to the view that the disease has existed amongst the Viverridae, probably for some centuries and that the virus has become modified by long existence in an unusual host, which accounts for its failure to spread readily amongst dogs. [The conception of virus modification is supported by KRAUS, R., & DURAN, A., working upon South American and Trinidad strains of rabies, who consider that these strains differ considerably from the classical Pasteur strain].

—E. J. PULLINGER.

JONNESCO, D. (1932). Recherches sur un virus rabique de rue à virulence renforcée. [**Research on a Street-Rabies Virus of Augmented Virulence**]. —*Ann. Inst. Pasteur.* **49.** 435-444. 1 table. [16 refs.]

A rabies virus isolated from a wolf proved to be very virulent and to have an unusually short incubation period. Known antirabic sera neutralized this wolf strain, and wolf-strain serum neutralized known rabies viruses. The incubation periods, unaltered by passage, were 3 days in the rabbit, 2 days in the guinea pig, 2 to 7 days in white mice (subcutaneous route), 2 to 3 days in the dog and 16 to 19 days in birds ; Negri bodies were demonstrated only in birds and in the eighth dog passage.—NORMAN HOLE.

LAJA, F. (1932). Veel virus-fixe'i sisaldus est süstitud loomade ajus. [**Is "Fixed [Rabies] Virus" contained in the Brains of Animals inoculated (according to Pasteur's Method)**].—*Eesti Loomaarst. Ring.* **8.** 135-137. 2 tables. [From abstract in German by H. RICHTER (TARTU)].

Laja gives some observations in continuation of his discussion in the *Eesti Loomaarst. Ring.* [(1931) **7.** 283], and states the result of the experiments undertaken to obtain further knowledge as to whether the fixed virus of rabies is still present in animals which have been immunized with brain substance by injection according to Pasteur's method.

DAVID considered that the frequent attacks of post-vaccinal paralysis in animals and human beings make it clear that the brain of the vaccinated animal still contains fixed virus since the injection of brain substance from other animals (heterologous albumin) predisposes the brain of vaccinated animals to retain the fixed virus.

Laja in the first instance injected two cats and five dogs with 1 c.c. of a 1 : 100 suspension of horse brain nearly every day to a total dose of 8 c.c. in the cats and up to 5, 7, 12 and 15 c.c. in the dogs according to size. Later they were injected subcutaneously with fixed virus in dilutions varying from 1 : 5 to 1 : 10 with a total of about 1 g. fixed virus and killed by chloroform one to nine days later.

From the brain of each of these animals a 10 per cent. suspension was prepared and injected subdurally into two rabbits. The rabbits showed no symptoms of disease over a period of three months. The author concludes that the fixed virus cannot be the cause of the frequently occurring post-vaccinal paralysis, at least as regards immunization in the Pasteur Institute, Tartu, where of 1,000 human beings inoculated, not a single case of post-vaccinal paralysis was observed.

—J. E.

Schneider, J. E., & McGroarty, B. J. (1933). **Transmission of Experimental Rabies from Mother to Young.**—*J. Amer. Vet. Med. Ass.* **82.** 627.

On February 10th, 1932, a sheep was injected subdurally with 0·2 c.c. of fixed rabies virus. Two days later the sheep gave birth to an apparently normal lamb. The sheep died of rabies on February 16th, the sixth day after injection, having nursed the lamb four days. The lamb was then fed on the bottle until the morning of February 24th, twelve days after birth, at which time it showed well pronounced symptoms of rabies.

The brain of the lamb was suspended in normal salt solution to contain 20 per cent. brain tissue and a 0·2 c.c. dose was injected subdurally into two rabbits. Both rabbits died of rabies in seven days.—Ll. E. W. Bevan.

I. Löffler, E., & Schweinburg, F. (1932). Zur Theorie der Immunität bei Tollwut. [Zweite Mitteilung]. [**Theory of Immunity in Rabies. 2nd Communication**].—*Virchows Arch. Path. Anat. Physiol.* **283.** 540-549. 4 tables. [35 refs.]

II. Löffler, E., & Schweinburg, F. (1932). Rabicides Serum im Tierversuch. [**Animal Experiments with Rabies Serum**].—*Wien. Klin. Wschr.* **45.** 813-814.

I. Massive blockade of the reticulo-endothelial system of rabbits was effected by 14 daily injections of indian ink. 10 c.c. of a 10 per cent. solution given intravenously as above served to produce a marked accumulation in the endothelial cells, as shown by subsequent *post-mortem* and histological examination. Blockaded and non-blockaded animals were immunized for varying periods with aetherized infected brain suspension and were subsequently tested for immunity. Fifteen blockaded animals showed no protection from the immunization. Of the non-blockaded group, 13 became sufficiently immunized to survive an active infection. The conclusion is drawn that the reticulo-endothelial system is associated with antibody production.

II. The apparatus controlling the transfer between the blood and cerebrospinal fluid [this apparatus is hypothetical] can be broken down by the method of Frohlich and Zak which is an intravenous injection of theocin (4 c.c. per kg. body weight). This breakdown allows rabies antibodies to reach the cerebrospinal fluid rapidly and in a high concentration. No experiments are given to support the above statements. [Theocin is an alkaloid derivative, theophyllin sodium acetate in a 3 per cent. solution].—E. J. Pullinger.

Tehver, G. (1932). Koertekatkust. [**Canine Distemper**].—*Eesti Loomaarst. Ring.* **8.** 177-185. 1 table, 1 chart. [10 refs.] [From abstract in German by H. Richter (Tartu)].

This article consists of a review of literature and a technical account of canine distemper as observed between 1910 and 1932 at the clinic for small domestic animals, at the Faculty of Veterinary Medicine, Tartu.

This account shows that there was fluctuation in the incidence of the disease from year to year and according to the season. The clinical types of the disease and the mortality are also discussed.

With regard to treatment, the author now prefers symptomatic methods of treatment. [No reference to specific immunization.—Ed.].—J. E.

I. Vigel, F. (1932). De la Peste Porcine et des Moyens de la combattre. [**Swine Fever and Methods of dealing with it**].—*Thesis for Docteur vétérinaire, Alfort.* pp. 87. [85 refs.]

II. Detre, L. (1933). Ueber die innere Reaktion bei der Simultanimpfung der Schweine gegen die Viruspest. [**The Reaction of Pigs to the Simultaneous Method of Inoculation against Swine Fever**].—*Deuts. tierärztl. Wschr.* **41.** 84-86. 1 table, 1 graph.

III. Uhlenhuth, P., Miessner, H., & Geiger, W. (1933). Der Tierversuch bei Virusschweinepest. [**Animal Experiments with the Virus of Swine Fever**].—*Ibid.* 97-100. [1 ref.]

I. The thesis takes the form of a review of the present-day knowledge of swine fever. Investigations upon serum therapy using the serum of Donatien and Lestoquard are also described. Unfortunately, these experiments are recorded in a very abbreviated form, attention being paid only to the success of treatment and much valuable data has been omitted.

The most important factors in diagnosis are the epidemiology, *post-mortem* appearance, the reaction to serum therapy and the bacteriology ; the last mentioned requiring the co-operation of a suitable laboratory. In connection with the *post-mortem* findings the author lays considerable stress upon the appearance of inflammation of the stomach.

To combat the disease the usual hygienic measures are cited. As a disinfectant, a 2 per cent. solution of a lye of sodium carbonate and slaked lime is recommended. As regards prophylactic vaccination, the danger of setting up foci of infection by the use of the simultaneous method is emphasized. It is urged that specific serum is the best agent for prophylactic or curative use.

II. A large proportion of pigs inoculated simultaneously with swine-fever virus and antiserum show no obvious reaction. Detailed temperature charts recorded for the fortnight following inoculation reveal slight temperature derangements. Using 1 c.c. of virus and 1 c.c. of antiserum [no attempt to standardize the reagents is recorded] a rise of temperature of 0·5° to 1°C. occurs between the third and the fourth days ; the temperature then falls gradually until the ninth day, but does not reach normal. A slight secondary rise of one-eighth of a degree follows, after which the temperature sinks slowly to normal. If a double dose of antiserum is given the temperature rise is delayed by about 24 hours. These curves were worked out upon two groups of 16 animals each.

III. This article gives details of the construction of pig sties used for the experiments described below. It is claimed that sties of this type fulfil all the hygienic requirements necessary to control the conditions under which experimental animals exist. It is emphasized that such control is essential before animal experiments are to be undertaken.

Using these sties, the question of the natural spread of swine fever was investigated. It was concluded that infection might spread through the air without direct contact or contact by fomites.

As regards the significance of animal inoculation experiments in the diagnosis of swine fever, it was found that a group of 75 experimental animals all gave a clear-cut answer of positive or negative except 4 per cent. which gave doubtful results. The authors consider that these few doubtful reactors are unavoidable, but that a satisfactory final answer can be obtained by " passage " or by parallel experiments. The need for an absolutely healthy strain of pigs for experiment is stressed.—E. J. Pullinger.

I. Plotz, H., & Ephrussi, B. (1933). Sur la survie des cellules embryonnaires dans le milieu employé pour la culture du virus de la peste aviaire. [**The Survival of Embryonic Cells in the Medium used for the Culture of Fowl Plague Virus**].—*C. R. Soc. Biol. Paris,* **112.** 525-526. [1 ref.]

II. Goodpasture, E. W. (1933). **Borreliotoses : Fowl-Pox, Molluscum Contagiosum, Variola-Vaccinia.**—*Science.* **77.** 119-121. [8 refs.]

I. In a previous communication, Plotz [this *Bulletin.* **3.** 248.] reported the successful cultivation in series of fowl plague virus in a medium containing living tissue cells. In the present article Plotz and Ephrussi record that, in a medium containing chick tissue, the embryonic cells survive for 12 to 13 days in the incubator at 37°C. and that when fowl plague virus is added to this medium the cells survive for only two days.

II. The author discusses the nature of the inclusion bodies of fowl pox, molluscum contagiosum and variola-vaccinia. He believes that the specific cellular inclusions of these three infections are composed of colonies of the respective viruses, which appear to be micro-organisms and to require an intracellular environment in their hosts for reproduction. The evidence upon which this claim is based is summarized.

Goodpasture has proved in the case of fowl pox that individual inclusions are totally and fractionally infective. The corpuscles of fowl pox, molluscum and vaccinia are filtrable, are not dissolved by dilute acids, are resistant to tryptic digestion and are insoluble in lipoid solvents. Fowl pox and vaccinia granules are agglutinated by specific immune serum. The granules react characteristically to certain staining methods, notably the silver method of Morosow [(1926). *Zlb. Bakt. I. (Orig.).* **100.** 385].

He considers that there are good grounds for placing these three viruses and some kindred ones in a separate group for which he suggests the generic title *Borreliota.*

" *Borreliota variolae hominis* : specific corpuscles of small-pox (Paschen bodies, elementary corpuscles).

" *Borreliota variolae bovis* : specific corpuscles of vaccinia (Paschen bodies, elementary corpuscles).

" *Borreliota variolae equi* : specific corpuscles of horse-pox.

" *Borreliota variolae porci* : specific corpuscles of swine-pox.

" *Borreliota variolae ovium* : specific corpuscles of sheep and goat-pox.

" *Borreliota mollusci* : specific corpuscles of molluscum contagiosum (Lipschütz corpuscles).

" *Borreliota avium* : specific corpuscles of fowl-pox (Borrel corpuscles)."

[Paschen bodies or elementary corpuscles are small bodies occurring in variolous lymph and vaccine lymph. They are small round coccus-like bodies about $0{\cdot}2\mu$ in size. There is little doubt but that they represent some phase of the aetiological agent. In fowl pox the cell inclusions are known as " Bollinger bodies " ; they are confined to the cytoplasm of the epidermal cells of the lesions. Each Bollinger body consists of an aggregation of minute coccoid structures, uniform in size and shape, known as Borrel bodies or elementary corpuscles].

—T. M. Doyle.

Baumann, R. (1932). Polyneuritis der Hühner (Mareksche Lähme), hervorgerufen durch ein filtrierbares Virus. [**Fowl Polyneuritis (Marek's Paralysis) caused by a Filtrable Virus**].—*Wien. tierärztl. Mschr.* **19.** 699-700.

The author describes a series of passage experiments with material isolated from the nervous system of a natural case of Marek's fowl paralysis. During the course of these experiments a filtrate was prepared and inoculated intramuscularly into 11 young fowls and subdurally into three of them ; all became affected after five weeks.

A more detailed paper about these cases is promised.—J. E.

Hasseltine, H. E. (1932). **Some Epidemiological Aspects of Psittacosis.**—*Amer. J. Publ. Health.* **22.** 795-803. 1 table. [8 refs.]

This article includes a summary of the history of psittacosis research. Considerable progress was made when it was learned that mice could be used as experimental animals and that passage through the mouse rendered the disease less infective to the human being. The fact that intranasal infection of the monkey was followed by the typical pulmonary form of disease gave a clue to the natural portal of entry of the virus. Suggested methods of control include a ban on the import of members of the parrot family, control and education of bird breeders and education of the public.—E. J. Pullinger.

INVERTEBRATE VECTORS OF DISEASE.

Philip, C. B., & Parker, R. R. (1933). **Rocky Mountain Spotted Fever. Investigation of Sexual Transmission in the Wood Tick Dermacentor andersoni.**—*Publ. Health Rep. Washington.* **48.** 266-272. [6 refs.]

It is shown that Rocky Mountain spotted fever can be transmitted during copulation from male to female ticks and *vice versa* and that the virus invades the tissues of the freshly infected vector. In 23 tests performed, transmission was effected from infected male to normal female in 4 out of 11 attempts and from infected female to normal male in 1 out of 12 attempts. It was not discovered through what medium the transference of infection was made. This leads to the possibility that the number of infected females of any given generation of ticks can be increased through the mating of infected males with hitherto non-infected females ; also an additional number of females may deposit a certain percentage of infected eggs as a result of fertilization by infected sperms.—Edward F. Peck.

Storey, H. H. (1932). **The Inheritance by an Insect Vector of the Ability to Transmit a Plant Virus.**—*Proc. Roy. Soc. London. Ser. B.* **112.** 46-60. 7 tables. [13 refs.]

All races of one insect vector species are not equally capable of transmitting a virus. The author has succeeded in breeding races of *Cicadulina mbila* capable of transmitting the virus of streak disease of maize and by crossing experiments has shown the property of virus transmission to be a simple sex-linked Mendelian factor.—Norman Hole.

I. Warburton, C. (1933). **On Five New Species of Ticks (Arachnida Ixodoidea). *Ixodes petauristae*, *I. ampullaceus*, *Dermacentor imitans*, *Amblyomma laticaudae* and *Aponomma draconis*, with Notes on Three previously described Species, *Ornithodorus franchinii* Tonelli-Rondelli, *Haemaphysalis cooleyi* Bedford and *Rhipicephalus maculatus* Neumann.**—*Parasitology.* **24.** 558-568. 9 figs. [5 refs.]

II. —. (1933). **Report of Committee on Tick Eradication.**—*J. Amer. Vet. Med. Ass.* **82.** 524-525. 1 table. [Presented at the 36th Annual Meeting of the United States Live Stock Sanitary Association. Nov. 30th, 1932].

I. Five new species of ticks are described from animals and reptiles not of veterinary interest. The dorsum of *Ornithodorus franchinii* is illustrated and its resemblance to *Argas brumpti* is mentioned. Warburton hesitates " to say that *Argas* and *Ornithodorus* should be combined into one genus," but thinks that

A. brumpti should be removed from the genus *Argas* and placed in the genus *Ornithodorus*.

II. The Committee reported that substantial progress had been made during the year in eliminating the cattle tick [*Boophilus annulatus*] from the remaining infested areas of the South. Of 15 states originally tick-infested, 12 have now been freed by a systematic eradication campaign in operation since the year 1906.

—J. S. Steward.

Bedford, G. A. H. (1932). **Description of *Argas striatus*, a New Species of Tick.**—*18th Rep. Direct. Vet. Serv. & Anim. Indust. Union of S. Africa.* Part I. pp. 221-222. 2 figs.

Bedford describes as a new species *Argas striatus* discovered in the examination of three unfed females found in the nest of a sociable weaver, *Philetairus socius* (Lath.).—J. S. Steward.

DISEASES CAUSED BY METAZOAN PARASITES.

I. Herms, W. B. (1932). **Insect Parasitology.**—*J. Econ. Entomol.* **25.** 222-232. [11 refs.]

II. Macdougall, R. S. (1932). **Insect and Other Enemies in 1931.**—*Trans. Highland & Agric. Soc. Scotland.* **44.** 130-151. 6 figs. [7 refs.]

I. The author deals with the subject in a general manner. The problems of host specificity and host range are considered, but greater space is devoted to a discussion of the transmission by insects of micro-organisms pathogenic to animal and plant life. The natural reservoirs of animal and plant diseases are also discussed.

II. The author, discussing the warble fly experiments in Scotland, reports encouraging results. He mentions that evidence accumulates that " polvo " or other reliable derris preparations are safe, cheap and efficient dressings for killing the warble larvae.

Descriptive accounts are given of the morphology, life history and economic importance of fleas and mosquitoes.—J. S. Steward.

Miller, D. (1932). **The Biology and Economic Status of New Zealand *Muscidae* and *Calliphoridae*. Part I. Historical Review.**—*Bull. Entomol. Res.* **23.** 469-477. [43 refs.]

Miller gives in this paper a general historical review of the New Zealand Muscidae and Calliphoridae under past and present conditions. An account is given of the earliest recorded occurrences of the different species in New Zealand and several Maori legends are quoted in which blowflies or maggots figure prominently.—J. S. Steward.

I. Bedford, G. A. H. (1932). **Trichodectidae (Mallophaga) found on African Carnivora.**—*Parasitology.* **24.** 350-364. 9 figs., 2 keys. [15 refs.]

II. Wigglesworth, V. B. (1932). **The Hatching Organ of *Lipeurus columbae* Linn. (Mallophaga), with a Note on its Phylogenetic Significance.**—*Ibid.* 365-367. 1 fig. [11 refs.]

I. The author describes two new genera *Suricatoecus* and *Protelicola* each comprising one species. A key is given to the genera of the family Trichodectidae

parasitic on carnivora ; a key is also given to the species of *Felicola* of which three new ones are described.

From the domesticated carnivora *F. subrostrata* is recorded from a cat.

T. canis is not yet reported from dogs in Africa although taken in Europe, America and Australia.

II. The author describes the hatching organ of *Lipeurus columbae*. It is a specialized part of the prelarval skin that is shed at the time of hatching and consists of a thickened plate bearing about 18 elongated spines or blades with lance-shaped points. It is very similar to that already described in sucking lice and unlike that of any other group of insects. This resemblance is considered as further evidence for the affinity of *Mallophaga* and *Siphunculata*.—J. S. Steward.

du Toit, P. J., & Bedford, G. A. H. (1932). **Goat Mange—The Infectivity of Kraals.**—*18th Rep. Direct. Vet. Serv. & Anim. Indust. Union of S. Africa.* Part I. pp. 145-152. 10 figs.

du Toit and Bedford undertook an experiment to test the accuracy or otherwise of the common belief that the parasites of goat mange (*Sarcoptes scabiei caprae*) can survive for very long periods when removed from the host.

The writers conclude from the experiment described that " a kraal which harboured mangy goats, if left empty for seventeen days, will no longer be able to infect clean goats."—J. S. Steward.

Flament, J. G. A. (1932). Contribution à l'étude de la Staphylo-démodécie canine. Rôle des Lavages et des Bains dans la Généralisation de l'Affection. [**Contribution to the Study of Staphylo-Demodectic Mange. The Part Played by Washing and Baths in the Generalization of the Affection**].—*Thesis for Docteur vétérinaire, Alfort.* pp. 66. [55 refs.]

Baths of any kind must be avoided in the treatment of demodectic mange. The moistening of the skin and the irritation by parasiticidal substances facilitate the extension of the disease and usually initiate staphylococcosis as a complication. Oil of cade and chaulmoogra oil are effective : the latter is more rapid in its action than the former and has a less powerful odour. The mixture advised is as follows :— chaulmoogra oil, 750 g., ether 250 g., carbolic acid 2 g.

The chaulmoogra oil must be the purest obtainable [according to the author there are many impure and spurious oils on sale in France]. The mixture is applied to the lesions, without rubbing, daily for the first five days and then once every two days. [Duration of treatment presumably dependent upon the progress of the case]. The hair need not be clipped. If ordinary precautions are taken to avoid getting the oil in the eyes or allowing the animal to lick it, no ill-effects need be feared.—George Slavin.

Boughton, R. V. (1932). **The Influence of Helminth Parasitism on the Abundance of the Snowshoe Rabbit in Western Canada.**—*Canad. J. Res.* **7.** 524-547. 12 figs., 1 plate, 3 tables. [18 refs.]

The snowshoe rabbit, *Lepus americanus*, is subject to periodic fluctuation in abundance and the author has carried out a series of helminthological examinations throughout twelve months in a part of Manitoba, to ascertain whether there was any correlation between scarcity of rabbits and the abundance of parasites. In the course of the work 420 rabbits were carefully examined. Of the ten species of parasitic worms encountered, two are new to science, *Nematodirus triangularis*, closely related to *N. filicollis* but differing in the bursa of the male, and *Synthetocaulus leporis*, closely related to *S. pulmonalis* but differing in that the female is

provided with " two club shaped organs " anterior and posterior to the vulva.

Direct evidence clearly showing parasites to be responsible for the wane in rabbit population was not found, but it is considered that *N. triangularis*, *S. leporis* and species of *Eimeria* are undoubtedly capable of producing an epizootic.

—E. L. Taylor.

I. Daubney, R. (1932). **The Life-Cycle of Moniezia expansa.**—*J. Parasitol.* **19.** 5-11. 1 table. [13 refs.]

II. Gordon, H. M. (1932). **A Note on the Longevity of *Moniezia* spp. in Sheep.**—*Austral. Vet. J.* **8.** 153-154. [2 refs.]

I. The author presents a short survey of recent publications on the life history of *Moniezia expansa* and gives a list of the possible intermediate hosts which have been tried by various investigators. An account is given of a muzzling experiment which he carried out in England in 1923. Of ten uninfected lambs, five were muzzled and turned out with five controls into infected pasture ; two of the controls were found on the 52nd day to have contracted infection and on the 157th day the remaining three controls were found also to be infected. Although the five muzzled lambs remained on the pasture for nearly three months longer, they did not become infected either with cestodes or nematodes. It is, therefore, concluded that infestation is contracted by ingestion during grazing.

II. Seddon reported the longevity of *Moniezia expansa* to be 65 to 70 days in his experimental sheep. An observation is here recorded, however, which shows that *Moniezia* spp. may live in a sheep for 12 months.—E. L. Taylor.

Bhalerao, G. C. (1932). **On Some Nematode Parasites of Goats and Sheep at Muktesar.**—*Ind. J. Vet. Sci. & Anim. Husb.* **2.** 242-254. 19 figs. on 4 plates, 1 table. [8 refs.]

A new species of metastrongyloid worm was found in the bronchi of sheep and goats ; it is characterized by the possession of four lips : the spicules of the male have bifid extremities and the vulva of the female is covered with a valve. A new genus *Varestrongylus* is made for its reception and the species is named *V. pneumonicus*. Two other new species are also described ; *Dictyocaulus unequalis* found in the bronchi of Tibetan sheep, closely allied to *D. filaria*, but differing in having smaller spicules and unequal branches of the ventral ray ; and *Ostertagia orientalis* found in the caecum of goats, an unusual site for worms of this genus ; this species closely resembles *O. marshalli*, but differs in minor points. A few notes are also given on *O. occidentalis*, *O. circumcincta*, *Oesophagostomum venulosum* and *Haemonchus contortus*.—E. L. Taylor.

Maplestone, P. A. (1932). **The Genera *Heterakis* and *Pseudaspidodera* in Indian Hosts.**—*Ind. J. Med. Res.* **20.** 403-420. 25 figs. on 3 plates, 11 tables. [8 refs.]

The author here reports on a collection of worms belonging to these two genera from birds which died in the Calcutta Zoological Gardens and from 100 domestic fowls purchased in a market in Calcutta. Three new species are described, *Heterakis pavonis* from the silver pheasant, differing from *H. gallinae* in that the short spicule has a peculiar barb ; *H. indica* from the domestic fowl, differing from *H. gallinae* in the tip and length of the short spicule ; and *Pseudaspidodera spinosa* from the Argus pheasant. *H. longicaudata* and *H. parisi* are regarded as synonyms of *H. gallinae* ; *H. lanei* and *H. hastata* are regarded as synonyms of *H. isolonche* and *H. caudata* as a synonym of *H. papillosa*.—E. L. Taylor.

Ober-Blöbaum, W. (1932). Untersuchungen über die Einwirkungen physikalischer Einflüsse auf die Larven von Pferdestrongyliden. [**Investigations on the Action of Physical Agents on the Larvae of Horse Strongyles**].—*Tierärztl. Rdsch.* **38.** 812-815. [9 refs.]

In this paper the author records his observations on the influence of freezing temperatures on the larvae of *Strongylus vulgaris*, *S. edentatus* and cylicostomes. He found that they could withstand freezing in ice at temperatures varying between –6° and –12°C. for four and a half months, and that eight and a half months at this low temperature was not sufficient to kill all of them. When not actually in ice, but kept on a dry glass dish in the refrigerator, they were found to remain alive for an even longer period ; after nine months 80 per cent. were still alive although of other larvae kept under the same conditions, but at room temperature, only 60 per cent. were alive at the end of the same period. In all the various observations the larvae of *S. vulgaris* were found to be less resistant than those of *S. edentatus* and of the cylicostomes. It was also observed that a temperature of 50°C. quickly killed larvae when in water, but that in the dry state they can withstand a higher temperature.—E. L. Taylor.

—. (1932). Korte Gegevens over de geschiedenis der trichinosis in Nederlansch-Indië. [**Short Details regarding the History of Trichinosis in the Dutch East Indies**].—*Ned.-Indisch. Blad. Diergeneesk.* **44.** 467-469. [Abst. from orig.]

A description is given of the work of the veterinary service in connection with the safeguarding of man against *Trichinella* infection in Sumatra.

Trichinosis was discovered for the first time in Batak pigs at Medan on the 19th November, 1929, and a regular inspection for trichinae has been organized at the slaughterhouse at Medan. In January, 1930, it was established that the infection appeared exclusively among the Batak pigs at Simeloengoen and in the Karo and Batak provinces. In December, 1930, trichinosis was also present in dogs in the Karo and the Batak provinces.

In August, 1932, it appeared from research carried out by the Veterinary Institute at Buitenzorg that the worm was identical with *Trichinella spiralis*, and material was forwarded to Baylis in London to get the diagnosis confirmed.

Research work on pigs and dogs is being continued.

—B. J. C. te Hennepe (Rotterdam).

Foster, A. O., & Cort, W. W. (1932). **The Relation of Diet to the Susceptibility of Dogs to Ancylostoma caninum.**—*Amer. J. Hyg.* **16.** 241-265. 4 tables, 4 graphs. [24 refs.]

This paper gives an account of a series of experiments on the correlation between undernourishment and susceptibility to infection of dogs with the dog strain of *Ancylostoma caninum*.

In all, nine dogs were used and it was found that their normal strong resistance (a result of their age and of previous infection) could be broken down by prolonged feeding on deficient diets. An increased rate of development and increased egg production of the worms in these dogs were also observed. On return to an adequate diet the egg production diminished ; a spontaneous loss of worms commenced and proceeded until the infection disappeared. In some of the more striking instances this disappearance of infection may be regarded as a dietary cure and the authors suggest, as a working hypothesis, that in a similar way, infections in man with the human hookworm may be partially or wholly eliminated

by improvement in diet alone. Generalizations on this subject must, however, be made with extreme caution.—E. L. Taylor.

Morgan, D. O. (1932). **On Three Species of the Genus *Capillaria* from the English Domestic Fowl.**—*J. Helminthol.* **10.** 183-194. 17 figs. [14 refs.]

An account is here given of the capillaria found in the examination of the intestines of 53 fowls. Of 42 intestines which were examined separately, 17 were found to contain capillaria referable to one or more of three species, *Capillaria longicollis*, *C. columbae* and *C. retusa*. This last mentioned species was only recognized on three occasions.

The three species are redescribed and a few notes given on their synonymy.
—E. L. Taylor.

IMMUNITY.

Mackie, T. J., Finkelstein, M. H., & van Rooyen, C. E. (1932). **The Comparative Bactericidal Action of Normal Serum, "Whole" Blood and Serum-Leucocyte Mixtures; with Further Observations on the Bactericidal Mechanism of Normal Serum.**—*J. Hyg. Cambridge.* **32.** 494-515. 15 tables. [11 refs.]

The authors' findings, which are briefly summarized here, apply to a wide variety of bacteria and are based on a large amount of data obtained by methods similar to those used earlier [see this *Bulletin.* **1.** 244 and **3.** 144]. Briefly, given amounts of " whole " blood, serum or serum-leucocyte mixture were inoculated with graded amounts of bacterial suspension and any bactericidal or growth-promoting effect determined by a comparison of the end-point of growth in transfers (a surface streak with a loop on to a suitable medium) made at once, after 4 hours and after 24 hours at 37°C. in a shaking machine.

The comparative bactericidal power of normal " whole " blood or serum-leucocyte mixture on the one hand and of serum or plasma on the other depends on the activity of the serum or plasma; when this is relatively weak (or absent) blood or serum-leucocyte mixture show the greater action, though such effects are still relatively weak; when strong, blood, etc. is less active, the lessened activity being due to an inhibition of the action of the leucocytes and of the serum bactericidins. Leucocyte suspensions may exert a temporary and usually weak bactericidal action. Bactericidal extracts markedly inhibit the bactericidal action of serum plasma but not that of leucocytes—equal action on serum and on " whole " blood. Dead bacteria also exert an inhibitory influence, more marked on " whole " blood. It is suggested tentatively that, when serum is strongly bactericidal, the killed organisms when phagocyted along with living bacteria interfere with the destruction of the latter which are protected from serum-bactericidins. Certain data are given of the time of maximum bactericidal action of serum on various organisms and of growth-promoting action following an initial bactericidal effect.
—A. W. Stableforth.

I. Greene, Meridian R. (1933). **The Effects of Vitamins A and D on Antibody Production and Resistance to Infection.**—*Amer. J. Hyg.* **17.** 60-101. 12 tables. [32 refs.]

II. Brown, A., & Tisdall, F. F. (1933). **The Role of Minerals and Vitamins in Growth and Resistance to Infection.**—*Brit: Med. J.* Jan. 14th. 55-57. 2 figs., 2 tables. [12 refs.]

I. Groups of rabbits were fed on vitamin A and vitamin D deficient diets respectively (xerophthalmia developed in the former in six to eight weeks and rickets in the latter in four to six weeks). No difference in the complement content of the serum, as compared with control animals, was noted in either group, but in vitamin A deficiency a definite leucocytosis appeared concurrently with the xerophthalmia in about 75 per cent. of the animals ; no change in the blood picture was observed in the vitamin D deficient group.

Following the injection of ox or sheep corpuscles, the vitamin A deficient group showed a poor haemolysin formation, whereas the vitamin D deficient animals reacted normally. Similarly, the agglutinin response to a *Bact. typhosum* antigen was lower in the A deficients than in the controls, but was normal in the D deficients. The A deficient rabbits were more susceptible to the inoculation of various organisms (*Bact. lepisepticum* and pneumococcus) while the same was true to a slightly less extent in vitamin D deficiency. Spontaneous infections with *Pseudomonas pyocyanea* occurred in the A deficient group.

II. The influence of minerals and vitamins on growth and resistance to infection is discussed. A series of rats fed on various diets were given, by the mouth, measured amounts of *Bact. muriotitis*. The results showed that, with a vitamin B deficient diet, the percentage of survivors was 16 as compared with 65 in normal rats, while with a vitamin D deficiency the figures were 28 per cent. and 55 per cent. respectively.

In experiments with children, the administration of a special cereal diet designed to furnish adequate supplies of all the necessary mineral and vitamin constituents resulted in a gain in weight four to five times the expected rate.

—R. E. Glover.

Ninni, C. (1933). Influence des sérums de Lapins normaux ou traités par le BCG sur les propriétés cuti-réactionnelles et toxiques de la tuberculine. [**The Effect of Rabbit Sera from Normal or BCG-Treated Animals on the Dermal and Toxic Actions of Tuberculin**].—*C. R. Soc. Biol. Paris.* **112.** 127-128. [2 refs.]

In this communication Ninni shows that when mixtures of rabbit serum and tuberculin are incubated for varying periods there is an almost entire suppression of the skin response in tuberculous guinea pigs and a distinct reduction in the precipitin reaction. This effect is produced both with unheated and with heated sera from normal rabbits or from animals immunized with BCG.

On the other hand, when the mixtures were inoculated intraperitoneally into allergic guinea pigs, no significant difference in the death rates was noted.

—R. E. Glover.

Zozaya, J., & Medina, L. (1933). **Immunological Reactions between Agar-Agar and some Bacterial Antisera.**—*J. Exp. Med.* **57.** 41-49. 6 tables. [11 refs.]

Previous work of Zozaya [this *Bulletin*. **2.** 657.] had suggested a relationship between the polysaccharides of meningococcus, *B. anthracis*, *Proteus vulgaris*, etc. This conclusion now requires revision since a further investigation has shown that bacteria grown on solid medium may adsorb a portion of the agar and that the complex thus produced stimulates agar precipitin antibodies in animals injected with these organisms. Confusion may thus occur through the appearance of non-specific cross reactions, but this danger arises only in animals which have been immunized over long periods (six weeks).—R. E. Glover.

DISEASES, GENERAL.

WAGNER, H. (1932). Sterilität und Vererbung. Kann das männliche Tier Uebertrager einer Minderwertigkeitsanlage im Geschlechtsapparat sein? [**Sterility and Inheritance. Can the Male transmit Predisposition to Poor Quality of the Sex Apparatus?**]—*Deuts. tierärztl. Wschr.* **40.** 547-550. [9 refs.]

The theory is advanced that high reproductive power and alternatively marked tendency towards sexual disorders ending in sterility are heritable characters transmissible from the male to its progeny by means of the germinal cell. A male possessing this characteristic of producing sterility shows no lowered fertility itself.

Cases of two cows are quoted. Both had several normal heifer calves and each produced one daughter showing sexual derangement early in life. These cases are claimed to show that closely related individuals can vary enormously as regards fecundity and that neither mother can be blamed for the production of the sterile offspring.

The author then discusses in detail the history of the progeny of a bull which served 42 cows, 27 calves being the outcome. Thirteen out of the 15 heifer calves were retained for observation and in due course were served. Of these, six showed sexual disorders ending in sterility between the second and fifth parturitions; three became sterile after the first parturition and four showed sexual disorders throughout life, becoming sterile after bearing from four to six calves. Of the 11 female calves born from the above, none gave birth more than twice before becoming sterile.

The chief features of these cases are the long periods between parturition and the following conception, generally a prolonged gestation period of from 292 to 320 days, frequent inflammation of the foetal membranes and a tendency to endometritis.

[No details are given of the hygienic conditions under which this herd existed].

—E. J. PULLINGER.

WILLIAMS, W. L. (1932). **The Pathology of Reproduction in Domestic Animals.** —*Vet. Med.* **27.** 261-317. 19 figs., 6 tables. [22 refs.]

This is a collection of five lectures, which occupy the whole scientific section of the July (1932) issue of *Veterinary Medicine*.

The titles of the parts are:—(1) "The Pathology of Reproduction in Perspective"; (2) "The Influence of the Health of the Newborn Animal Upon Its Ultimate Breeding Efficiency"; (3) "The Nutritive Supply and the Breeding Power"; (4) "The Role of the Male in the Pathology of Reproduction" and (5) "The Puerperal Period in Relation to the Pathology of Reproduction."

The author gives a summary of his vast experience in this field and particularly emphasizes the importance of good health from birth for the future fertility of breeding animals. The work is very valuable and should be studied in the original.

—J. E.

DORVAL, J. (1932). Contribution à l'étude de la Gangrène Post-Partum de la vulve. [**A Contribution to the Study of *post-partum* Gangrene of the Vulva**]. —*Thesis for Docteur vétérinaire, Alfort.* pp. 51. [7 refs.]

In this thesis the author describes the aetiology, symptoms, pathology, differential diagnosis and treatment of *post-partum* gangrene of the vulva, a condition which he concludes is a pathological entity and not a secondary localization of

puerperal septicaemia. Although the precise causal agent has not been identified, the condition should not be attributed to injury during parturition, because it often occurs, particularly in primiparae, when the parts are free from injury. Gangrene usually sets in about the third day after parturition ; the prognosis is grave, death taking place within a day or two.

The author describes the course of 18 clinical cases (17 cows and one mare) in 14 of which anti-gangrene serum prepared at the Pasteur Institute (monovalent in eight cases and polyvalent in six cases) was used as a curative measure without success.—Gwilym O. Davies.

Laas, A. (1932). Die Nachprüfung der Nierenfunktionen mittels Blutharnstoffbestimmung an Haemoglobinaemia enzootica-und Myoglobinaemia (Haemoglobinaemia)-paralytica-kranken Pferden. [**Testing Kidney Function by Blood Urea in Haemoglobinaemia enzootica and Myoglobinaemia paralytica of Horses**].—*Arch. wiss. prakt. Tierhlk.* **65.** 460-474. [21 refs.]

Discusses theories of kidney function, the level of blood urea in renal insufficiency, 17 analyses on 15 normal horses, 89 in 70 cases of haemoglobinaemia enzootica (of which 30 were fatal) and 73 in 63 cases of myoglobinaemia paralytica [see Carlström, this *Bulletin.* **1.** 234].

In haemoglobinaemia enzootica blood urea generally varied between 30 mg. and 119 mg. per 100 c.c. according to the stage of the disease, e.g. one case showed 30 mg. on admission to clinic but 100 mg. before death, while an extreme case rose from 76 mg. to 162 mg. in two days. Renal insufficiency was generally shown within three days of first symptoms.

In myoglobinaemia paralytica (haemoglobinaemia or haemoglobinuria paralytica) blood urea was usually normal for the first 24 hours but rose thereafter —average 70 mg. on the third day.

Although accurate prognosis could not be made on blood urea alone the analytical figure is regarded as useful in conjunction with other symptoms.

—H. H. Green.

Mglej, S. (1933). Badania hematologiczne u zdrowych i chorych koni. [**Haematological Investigations in Sound and Sick Horses**].—*Przeglad. Wet.* **46.** 41-53. 1 table, 3 charts. [25 refs.] [Summary in German : abst. from orig.].

The author traces the history of blood sedimentation in human and veterinary medicine and then describes his own experiments carried out with blood obtained from 15 healthy and 89 sick horses. He observed the blood level every five minutes over 45 minutes and at the same time made a blood cell count and estimated the haemoglobin content. The sedimentation in the blood of the healthy horses finished within 45 minutes. In cases of obstipation the blood sedimentation lasted longer and there was often leucocytosis. A similar statement has been made with regard to cases of icterus, infestation with intestinal parasites, chronic emphysema and after the administration of purgatives. The blood sedimentation occurs a little earlier than in normal blood, in cases of acute bronchitis, laryngitis and "strangles."—K. Szczudlowski (Lwow).

Davidson, L. S. P. (1932). **The Classification and Treatment of Anaemia, with Special Reference to the Nutritional Factor.**—*Edinburgh Med. J.* **39.** 105-151. 4 tables, 5 charts. [65 refs.]

The author considers the mechanism of haemopoiesis and the methods employed in classifying various types of anaemia in the human subject. The following summary indicates his classification :—

I. Nutritional deficiency anaemias.

A. Due to defective production or faulty assimilation of the specific anti-anaemic substance found in liver, (1) primary and (2) secondary macrocytic hyperchromic anaemias.

B. Due to defective absorption and assimilation, or to reduced intake, of the factors necessary for haemoglobin formation, (1) primary and (2) secondary microcytic hypochromic anaemias.

Many cases of diseases in group A (2) show failure in iron assimilation and therefore pass into group B (2).

II. Post-haemorrhagic anaemias, acute or chronic.

III. Haemolytic anaemias, (1) from sudden severe haemolysis with haemoglobinaemia and haemoglobinuria, (2) from steady incessant haemolysis associated with excessive activity of the reticulo-endothelial system, leading to icterus and splenomegaly.

IV. Anaemias due to depression of bone marrow function.

A. Idiopathic aplastic anaemia and idiopathic agranulocytic angina.

B. Aplastic or partially aplastic anaemias secondary to other states.

Since several factors may be present in an individual case no classification can be perfect but the one given by the author provides a scheme for diagnosis and treatment.

Thus the anaemias of group I A are all macrocytic hyperchromic diseases requiring the administration of liver, liver extract, or ventriculin. The anaemias of group I B and group II are microcytic hypochromic diseases and require a well-balanced dietary with massive doses of iron. In group III the essential treatment is removal of the factor causing haemolysis e.g. splenectomy in acholuric jaundice and quinine therapy in malaria. In group IV the guide to correct treatment is an understanding of the underlying causal factor e.g. obviation of a toxic factor if present.

The author discusses a large number of cases in the human subject mentioning group B (1) as exceedingly common in women between the ages of 30 and 50.

Treatment is discussed at considerable length e.g. liver therapy in pernicious anaemia, vitamin therapy in anaemias associated with avitaminosis, iron therapy in most microcytic hypochromic anaemias.

Although the results from iron therapy are often spectacular, the author emphasizes the importance of other factors in the manufacture of haemoglobin. Of special interest is the fact that certain nutritional anaemias require massive doses of iron continued for several months but that much smaller doses suffice after haemoglobin has returned to normal—a fact which suggests that iron, in addition to supplying a dietary essential, has a direct stimulative action on the bone marrow.

Differential diagnosis is fully discussed and cases are cited to illustrate the difficulties of diagnosing microcytic anaemias of unknown origin.

[If difficulty is experienced in obtaining the original journal a longer abstract can be supplied on request. The original should prove of special interest to veterinarians who wish to compare anaemias of domesticated animals with anaemias of the human subject. It may be recalled that the so-called " iron deficiency diseases " of cattle have so far been investigated from the nutritional and chemical standpoints without adequate study of the morphological blood picture, clinical syndrome and complicating pathological factors—see this *Bulletin*. **1.** 314. and **3.** 40, 374 and 429.].—H. H. Green.

Gill, D. A. (1933). **Circling Disease of Sheep.**—*New Zealand J. Agric.* **46.** 251-255. 2 figs.

A popular article on " circling disease " contributed as an advice to farmers on the subject and asking for their co-operation in future research work.

Differential diagnosis from coenurus infestation is given followed by a description of the larvae of *Oestrus ovis*, from the first stage onwards, these first stage larvae being suspected in some indirect manner of causing the trouble.

Previous work, showing how the causal organism found in the brain has a predilection for the brain and lungs of sheep, is described.

It is obvious that the author considers that there is every possibility of fly larvae, particularly larvae of *O. ovis*, playing an important part in the spread of " circling disease."—C. S. M. Hopkirk.

Holle, A., & Holle, H. (1932). Die Puerperaleklampsie und Tetanien der Sauen und ihre Behandlung mit Calcium. [**Puerperal Eclampsia and Tetany in Sows and its Treatment with Calcium**].—*Deuts. tierärztl. Wschr.* **40.** 846-848. [5 refs.]

The authors have observed several cases of illness in sows among the stock of small farmers in Munster.

Puerperal eclampsia, manifested by generalized tetany, involuntary movements and crying out, affects sows during farrowing, and tetany, with a gradual onset, occurs in sows during the suckling period. Both conditions are curable by calcium therapy (5 g. calcium chloride crystal per 100 kg. body weight, given intravenously into an ear vein and subcutaneously around the base of the ear).

—J. E.

van Lier, G. A. (1932). Buik- en borstwaterzucht als naziekten van influenza bij den hond. [**Hydrops of the Abdomen and Thorax in the Dog after Influenza**].—*Ned.-Indisch. Blad. Diergeneesk.* **44.** 60-66.

In many cases of canine influenza the kidneys were attacked, resulting in ascites. [The author uses the term " influenza," but the nature of the disease is not clear ; it does not appear to be a suitable term. Ed.]. van Lier describes cases of this type, which always had a fatal course on account of exhaustion or shock. Cases were also reported in which, after " influenza," the abdomen became dilated, but at *post-mortem* examination no sign of ascites could be discovered although there was effusion in the thorax.

From the right thoracic cavity of a dog 8,720 c.c. of transudate were taken in 45 days, whilst from the left side 11,440 c.c. were taken.

The author recommends that dogs that have recovered from " influenza " should undergo a cure for improvement of the metabolism in order to prevent the development of dropsy later.—B. J. C. te Hennepe (Rotterdam).

Zschokke, W., & Saxer, E. (1932). Beobachtungen bei Pelztiererkrankungen. I. Ein Fall von Pseudotuberkulose beim Sumpfbiber (Nutria). II. Eitrigfibrinöse Pleuritis beim Waschbär und Nerz. [**Observations on Diseases of Fur Animals. I. A Case of Pseudotuberculosis in a Coypu. II. Empyema in a Racoon and a Mink**].—*Schweiz. Arch. Tierhlk.* **74.** 446-450 and 589-592.

I. A case of pseudotuberculosis in a coypu (nutria) is recorded. No definite symptoms of disease, with the exception of rapid emaciation, had been noticed. Lesions of the nodular type were apparent in nearly all the organs, including the liver, spleen and kidneys. A Gram-negative aerobic bacillus showing bipolar staining was isolated from the nodules and heart blood. Its pathogenicity for mice and guinea pigs was tested by subcutaneous and intraperitoneal inoculation,

The organism was stated to be non-motile and considered to be identical with that causing pseudotuberculosis in rodents. [*Pasteurella pseudotuberculosis* is motile if grown at a temperature below 30°C. ; the authors tested their strain after growth at 38°C.].

II. Cases of empyema occurring in a racoon and a mink on the same farm are recorded. Gram-positive diplococci and coliform bacilli were isolated from pleural exudate and heart blood and were considered to be of aetiological importance.—R. Lovell.

I. Asmundson, V. S., & Biely, J. (1932). **Inheritance of Resistance to Fowl Paralysis** (*Neurolymphomatosis Gallinarum*). **1. Differences in Susceptibility.** —*Canad. J. Res.* **6.** 171-176. 3 tables. [13 refs.]

II. Biely, J., Palmer, V. E., & Asmundson, V. S. (1932). **Inheritance of Resistance to Fowl Paralysis** (*Neurolymphomatosis Gallinarum*). **2. On a Significant Difference in the Incidence of Fowl Paralysis in Two Groups of Chicks.**—*Ibid.* 374-380. 6 figs. on 1 plate, 4 tables. [8 refs.]

III. Biely, J., & Palmer, V. E. (1932). **Observations on the Gonads of Male Birds Affected with Fowl Paralysis** (*Neurolymphomatosis Gallinarum*).—*Ibid.* **7.** 293-299. 12 figs., 2 plates. [12 refs.]

I. Data on the incidence of paralysis and lymphomatous tumours in a flock of 542 pullets of six different breeds indicate the presence of both in 14 out of 52 paralysed pullets, while an additional 22 had tumours but were not paralysed. The evidence presented, while not conclusive, points to the inheritance of resistance to paralysis. This is indicated particularly by the differences in the proportion of paralysed pullets in different breeds and the absence of paralysis among the progeny of certain males and in certain large families.

II. For these experiments two groups of 30 chickens each were employed, hatched from a susceptible and an apparently resistant flock. There was a significant difference in the incidence of fowl paralysis and lymphomatous tumours in these two groups. This is interpreted to mean that there is an inherent difference in susceptibility and resistance to fowl paralysis and lymphomatous tumours. The authors consider that the early incidence of fowl paralysis points to transmission through the egg.

III. Six male birds affected with fowl paralysis were selected. *Post-mortem* examination revealed lymphoid infiltration in the nervous systems and in the testes. In three of the birds lymphomatous tumours were found in the testes. Examination showed that spermatogenesis was definitely suppressed.

—Norman Dobson.

Kassirskiy, J. A. (1932). Die Methode der Knochenmarkpunktion bei tropischen Erkrankungen Mittelasiens. [**Examination of Bone Marrow in Tropical Diseases**].—*Arch. Schiffs- u. Trop.-Hyg.* **36.** 492-495.

In the diagnosis of kala-azar [leishmaniasis], bone marrow is preferable to spleen puncture as the latter is a blind operation and liable to be followed by dangerous sequelae. [In the domestic animal, bone manipulations are contra-indicated owing to the difficulty of avoiding the introduction of infection either during the operation or in the after-treatment. In addition, the peritoneum of the domestic animal is relatively indifferent to ill-treatment. In the large animals, lymph gland puncture frequently serves in place of spleen puncture for diagnosis, e.g. East Coast fever].—E. J. Pullinger.

Broersma, S. (1933). Grastetanie en het Gebruik van Kunstmest in den Landbouw. [**Grass Tetany and the Use of Artificial Fertilizers in Agriculture**].—*Tijdschr. Diergeneesk.* **60.** 68-71. 1 table. [Abst. from orig.]

A discussion of the articles which appeared in the different agricultural periodicals has been published in connection with the writer's article of the 15th August, 1930.

He considers that the continual application of artificial fertilizers to pasture land leads to a decrease in its food value for cows. Besides this, owing to the artificial increase in the production of the cow, this animal will become sensitive to all kinds of outside influences.

Sjollema also states in this connection that artificial fertilizers cannot always be regarded as the principal agent in the aetiology of grass tetany. An excessive application of natural manure can also increase the danger of its occurrence.

As a single injection of calcium chloride or of calcium chloride mixed with magnesium chloride leads to a recovery within a few minutes, there is no question of phosphorus poisoning.—B. J. C. te Hennepe (Rotterdam).

PUBLIC HEALTH.

Cary, C. A. (1933). **Report on Meat and Milk Inspection.**—*J. Amer. Vet. Med. Ass.* **82.** 360-376. [Report received at the 36th Annual Meeting of United States Live Stock Sanitary Association held in Chicago from Nov. 30th to Dec. 2nd, 1932].

This report summarizes the replies to a questionnaire which had been circulated in the different states and to which 42 answers had been received. The answers show that the system of both meat and milk inspection in these states varies considerably, not only in the states, but also in the cities situated therein. In certain areas there is no inspection, while in others it is carried out by veterinarians (some whole-time and some part-time), by medical men and even by laymen. The special committee investigating the systems of meat and milk inspection make 12 recommendations on the subject.—D. S. Rabagliati.

Prescott, S. C., Bates, P. K., & Highlands, M. E. (1932). **Numbers of Bacteria in Frozen Food Stored at Several Temperatures.**—*Amer. J. Publ. Health.* **22.** 257-262. 6 tables.

Bacteriological examinations were made of the number of bacteria present in food at various temperatures, viz., at −6·6°, −12° and −18°C., i.e. quick freezing. The foods were lamb chops, strawberries, raspberries, spinach, haddock and orange juice. The bacterial content was counted at the start of the experiments and again every week for 12 weeks in the case of the first three foods, 23 weeks for the haddocks and 35 days for the orange juice. The workers concluded that, though it is difficult to formulate conclusions from the limited number of experiments, it appears that there is every indication that frozen food, if carefully prepared and stored, can be merchandized with an adequately low micro-organism content. The small number of bacteria present and the slight increases noted do not seem sufficient to explain the chemical and physical changes in pH titrable acidity, weep, colour, etc., detected, which are probably due to enzymes.

—T. Dunlop Young.

I. Cronk, H. L. (1932). **A County Health Officer and the Milk Problem.**—*Publ. Health. London.* **45.** 114-119. [11 refs.]

II. Medlock, F. W. (1932). **The Supervision and Control of Milk-producing Animals and what it means to the Public.**—*Vet. Rec.* **12.** 950-952.

III. Rabagliati, D. S. (1932). **The Veterinary Profession and the Milk Supply.** —*Ibid.* 1403-1407.

IV. —. (1932). **Milk Supply in Belfast.**—*Brit. Med. J.* Aug. 27th. 419.

I. This article reviews the position of School Milk Clubs and discusses the methods of preventing tuberculous infection from milk. The beneficial effects of a milk ration on mental alertness were proved by Mann (1926) and the present law permits of the allocation of money by local authorities for the purchase of milk for children who, from lack of nourishment, are unable to take advantage of the educational instruction. The chief danger is that of milk-borne disease, particularly tuberculosis of bovine origin. The writer shows that it is improbable that the bovine bacillus is capable of inducing an immunity to tuberculosis in human beings. The institution of tuberculosis-free herds or the routine clinical-laboratory examination are both methods which are expensive, not universally applicable and do not cover the question of other pathogens. It would appear that pasteurization is the best procedure. The author attempts to prove that objections to pasteurized milk with regard to the vitamin and soluble phosphate content are founded on slender evidence whilst, on the other hand, there is good reason for concluding that all pathogens are rendered harmless. The writer's final recommendations include (a) that all milk sold raw should be guaranteed free from tubercle bacilli and (b) that all other milk should be pasteurized.

II. In this paper, presented to the Congress of the Royal Sanitary Institute, the writer asserts that bovine tuberculosis is the most important of the milk-borne diseases. The observations of Griffith (1920), Corbett (1922), Gordon and Brown (1923) and Savage are cited as proof of the pathogenicity of the bovine type to human beings. The author recommends that the operation of the Milk and Dairies Acts and the Diseases of Animals Acts, England and Wales, be made compulsory and considers that the failure of authorities to enforce these regulations is responsible for the dangerous nature of many milks. The author advocates routine veterinary examination of all herds as not only the best means of detecting mammary disease, but also of instructing the stock owner in preventive methods.

III. The writer emphasizes the seriousness of infection of milk with bovine tubercle bacilli in relation to tuberculosis in man. He then discusses the means of controlling the incidence of this infection in the different types of milk. To eliminate the occasional instance in which tubercle bacilli have been detected in milk from Certified or Grade A " T.T." herds, the writer recommends a general tightening-up of the regulations and condemns the single test as being an insufficient safeguard for the introduction of cattle from non-tested herds. With regard to pasteurized milk, the author quotes reports to prove that pasteurized milk has been found to contain living tubercle bacilli and that the *coli* content is frequently unsatisfactory. The cleanliness and safety of ordinary milks depend upon the efficiency with which local authorities enforce the present legislation.

IV. This is a review of a letter written by the Chief Medical Officer of Health, Belfast, who says that a Public Health Committee has been set up to arrange that only Grade A " T.T." and pasteurized milks be sold in the city, one year's notice being given to vendors. After referring to the opinion held by Savage, the writer suggests that the following rules should be adopted by all urban authorities :—(1) that all milk sold within the jurisdiction of the authority should either come from tuberculin-tested herds or be effectually pasteurized ; (2) that no milk treated by heat, other than by the official process of pasteurization, should be imported into the area ; (3) that there should be compulsory classification

of all grades of milk sold within the area and (4) that adequate supervision and control over the health of all persons engaged in the production and distribution of milk should be secured.—G. B. Brook.

Breed, R. S. (1933). Les bactéries thermophiles du lait pasteurisé par la pasteurisation basse. [**Thermophilic Bacteria of Milk Pasteurized by the Low Temperature Method**].—*Le Lait.* **13.** 60-81. [78 refs.]

The usual bacteriological examination of milk pasteurized by the low-temperature method may not reveal the true quality of the milk, owing to the fact that thermophilic bacteria may be present. To detect these the milk should be examined microscopically and additional plates incubated at 55°C. Large rod-shaped organisms are probably thermophiles : the plates will show if this is true. The organisms which stain well with methylene blue are probably alive. The importance of these bacteria is that they multiply rapidly in the pasteurizing plant and spoil the milk.—George Slavin.

Martinaglia, G. (1932). **A Diphtheroid Organism showing Acid-Fast Properties in Milk Smears.**—*J. S. Afric. Vet. Med. Ass:* **3.** 163-166. 2 figs. [3 refs.]

During an examination of milk coming into Johannesburg, a diphtheroid organism was observed in milks from asymmetrical and normal udders. It was found that if single colonies were found in Herrold's agar-egg-yolk medium and placed in milk or litmus milk, the organisms grew in groups of acid-fast and non-acid-fast bacilli, a close morphological resemblance being shown between the two groups about the third or fourth day of incubation. Those organisms occurring in the lighter areas of the smear, being rich in fat globules, showed a greater tendency to acid-fast properties. Acid-fast staining was only seen in this medium.

A brief discussion of the relevant literature is given, together with a biological description of the organism. In competent milk examination this organism would not be confused with pathogenic diphtheroids as not only is it short, but it is not associated with epithelioid cell grouping seen in tuberculous udders.

—Edward F. Peck.

I. Walters, H. W. (1932). **Bacteriology of Milk and Methods of Sampling.** —*J. Roy. Sanit. Inst. London.* **53.** 1-6. 1 table.

II. Keith, T. S. (1932). **The Bacterial Count in the " Graded " Milks.**—*Ibid.* **53.** 6-11. 3 tables.

III. —. (1932). **Bacteriological Standards for Milk and Ice-Cream.**—*Lancet.* **223.** 1230.

[I and II were papers read at a Meeting of the Royal Sanitary Institute, London].

I. This paper expresses a desire for official guidance in the taking of bacterial count samples of graded milk from large milk vessels. Experiments have shown that in churns bacteria do not remain evenly distributed but are present in greater numbers near the surface. A table is given showing bacterial counts in illustration of this.

II. This paper discusses the sampling of milk for bacterial counts and the possibilities of contamination of the milk during sampling. Unless a sample can be delivered at the laboratory within ten minutes of collection, it should be packed in ice. Thorough mixing of the sample is necessary prior to carrying out the laboratory test. The diversity of counts is due entirely to differences in mixing technique.

In the discussion which followed this paper, Meanwell said that failure

to pack in ice increased the count two-fold in half an hour at 60°F. POTTIER drew attention to the variations in reports on the same milk sample from two different laboratories, the differences extending to the test for *Bact. coli*.

III. This annotation deals with the unsatisfactory state of the law as it stands at present with regard to bacteriological standards for milk, as revealed at a joint meeting of the Society of Chemical Industry and the Metropolitan Branch of the Society of Medical Officers of Health. Medical officers are forced to prosecute in some cases the very firms who are spending money in trying to improve their milk. Figures from seven London boroughs show that from 7 to 44 per cent. of graded milk samples exceeded the required bacterial count standard. Errors of 100 to 200 per cent. in bacterial counts are possible and the test cannot be regarded as having the exactitude of chemical analysis for fat.

There are no legal standards for ice-cream, yet there is much need for control as samples may contain as many as 256 millions per c.c.

There is nothing to replace the bacterial count at the moment as a standard of cleanliness, nor is there any simple routine method of estimating tubercle bacteria. Safety in milk is by no means synonymous with cleanliness, severe epidemics having been caused by the highest grade of milk.—S. H. GAIGER.

THERAPEUTICS.

SEELEMANN, M. (1933). Zur Chemotherapie des gelben Galtes. [**On the Chemotherapy of Streptococcal Mastitis**].—*Tierärztl. Rdsch.* **39.** 111-115.

The author, commenting on the conflicting results reported by workers on the treatment of mastitis, states that most of them are worthless on the grounds of inadequate diagnosis, technique and control. He has carefully tested different therapeutic methods over long periods of observation and comes to the following conclusions :—vaccination, either prophylactic or curative, is of no value ; the frequent stripping method is beneficial, but very rarely cures by itself ; hygienic measures are of the greatest importance when combined with a detailed systematic bacteriological inspection of the milk of every cow in the herd ; and udder irrigations, performed strictly in accordance with the foregoing (hygiene), have a distinct value in ridding the udder of infection : so far only two preparations (from many tested), " rivanol " and " entozon," have proved valuable in this respect.

The conditions necessary for success, which are only attainable if considerable effort and trouble are taken, are discussed in detail. [See this *Bulletin*. **3.** 101].

The question of relapses after treatment is referred to and an alteration of the behaviour in broth of streptococci isolated from relapse cases is described.—J. E.

VELU, H., ZOTTNER, G., & IPOUSTEGUY. (1932). Essais de traitement de la Theilériose bovine Nord-Africaine par l'antimosane. [**Trials of Treatment of North African Bovine Theileriasis with Antimosan**].—*Bull. Soc. Path. exot.* **25.** 136-140. [4 refs.]

A brief clinical report of 13 head of cattle infected with *Theileria dispar*. They were given single or repeated doses of antimosan intravenously ; eight recovered and five died.—J. E.

I. GÖTZE, R. (1933). Ueber die Derrisworzel [Tuba root] und ihre Anwendung zur Bekämpfung von Ektoparasiten bei Rindern. [**Tuba-Root in the Campaign against Ectoparasites in Cattle**].—*Deuts. tierärztl. Wschr.* **41,** 129-131. [9 refs.]

II. Bartels. (1933). Ergebnisse der im Bezirk Schleswig im Jahre 1932 angestellten Versuche zur Bekämpfung der Dasselfliegenplage. [**Results of Experiments in 1932 in Controlling the Ox Warble Fly Plague in the District of Schleswig**].—*Ibid.* 145-147. 1 table. [3 refs.]

I. The author emphasizes that derris root is a useful, simple, cheap and harmless remedy. He states, however, that many of the derris root preparations on the market are relatively useless. The insecticide content of the plant, rotenone, varies considerably in amount. The useless preparations form a finely powdered, bright brown meal, which does not become opaque when put in cold water. Powder prepared from good quality root becomes frothy when mixed with cold water and the solution is opalescent. Such a sample was only obtainable from a particular firm in Malaya. Detailed directions for preparing and applying the mixture are given.

II. " Delicia " warble fly oil from Freytag's chemical works at Delitsch killed the warbles on 619 cattle, but it cannot be recommended because it irritates the skin. The treatment of 10,157 animals with " Larfug " ointment yielded good results, but it is expensive and more labour is required for its application. Warbles were found in older cattle, which is said to be contrary to the experience of other writers. Some larvae, particularly those in the third stage, will have died before treatment is commenced ; this must be taken into consideration when judging the efficacy of a remedy. When examining the vitality of larvae, it is preferable to place them in sunlight and then to immerse them in warm water, as any movements made then tend to be vigorous. On account of the irritation sometimes caused by " delicia oil," the effect of any preparations of unknown composition should be tried out on a few animals only.

To ensure full success in warble eradication, the treatment must be continued for several years in any particular area. For eradication in large districts, legislation is necessary.—F. W. Müller (Berlin).

I. Schoemann. (1932). Neues aus der Hundepraxis. [**Further Notes on Canine Practice**].—*Berl. tierärztl. Wschr.* **48.** 837-838. [2 refs.]

II. Reinhardt, R. (1933). Arekolin als Antitaenikum. [**Arecoline Therapy in Taeniasis**].—*Ibid.* **49.** 129. [4 refs.]

I. The author has treated taeniasis in dogs with a mixture of arecoline-glycerol and " ether oil," 1 c.c. of the solution containing 2 mg. arecoline hydrobromide with a dose of 1 c.c. per 1 kg. body weight, administered *per os*. All the dogs treated became seriously ill, but no deaths occurred. He then gave a smaller dose, 1 mg. arecoline hydrobromide per 1 kg. body weight. The results were successful, the only symptom being occasional vomiting. The author considers it dangerous to administer arecoline hydrobromide to small or young dogs on account of its pronounced toxic properties.

II. Reinhardt has treated taeniasis in dogs for six years with good results at the clinic at Leipzig University by dosing with 2 mg. of arecoline hydrobromide per 1kg. body weight, giving it in an aqueous solution containing raspberry juice. He assumes that the symptoms observed by Schoemann have their origin either in excessively rapid absorbtion of the alkaloid caused by decomposition of the mixture, or in the formation of very toxic substance on account of its instability.

—F. W. Müller (Berlin).

Wright, W. H., & Schaffer, J. M. (1932). **Critical Anthelmintic Tests of Chlorinated Alkyl Hydrocarbons and a Correlation between the Anthelmintic**

Efficacy, Chemical Structure and Physical Properties.—*Amer. J. Hyg.* **16.** 325-428. 14 tables. [55 refs.]

This paper reports on the results of an extensive series of tests on the anthelmintic properties of 17 chlorinated alkyl hydrocarbons. Naturally infected dogs were used as test animals, in the way generally employed at the United States Bureau of Animal Industry. The drug was administered after a suitable fast, all worms expelled were collected and identified and the dog subsequently killed; the remaining worms were then collected at *post-mortem* examination and the efficiency of the drug thus ascertained for each of the species present, and stated as a percentage of worms removed.

The following compounds showed marked action on hookworms and were sufficiently well tolerated by the host to permit of their use in treatment: *n*-butyl chloride, 2-chlorpentane, 3-chlorpentane and *n*-butylidene chloride. *n*-Propyl chloride, *n*-butyl chloride, the amylene dichlorides, *n*-butylidene chloride and trichlorethylene proved to be highly effective for the removal of ascaris.

The correlation between chemical structure and physical properties and anthelmintic efficiency is discussed at length. It is concluded that the anthelmintic efficiency of chlorinated alkyl hydrocarbons is not solely dependent upon the chlorine concentration nor upon the position of the chlorine atom or atoms in the molecule, but is intimately linked with water solubility. With a single exception, the compounds tested, having water solubilities between 1 : 1,250 and 1 : 5,300 for hookworms and 1 : 350 and 1 : 3,500 for ascaris, were found to possess potent anthelmintic properties regardless of the chemical structure. Although the anthelmintic efficiency of the various series of compounds tested was found to increase or decrease with some regularity according to the length of the hydrocarbon chain or the increase of the number of chlorine atoms, no dependable guide was discovered and as soon as the series moved out of the range of water solubilities the anthelmintic efficiency became too low to be of any practical value.

—E. L. Taylor.

I. Johnstone, R. W., Wiesner, B. P., & Marshall, P. G. (1932). **The Therapeutic Application of Gonadotropic Hormones ("Rho Factors").**—*Lancet.* **223.** 509-511.

II. —. (1932). **Sex Hormone Therapy.**—*Ibid.* 525.

I. The first paper deals with the present knowledge of ovarian and pituitary hormones in the light of animal experiment. The ovarian secretion is known to contain two factors, oestrin (α factor) and progestin (β factor), secreted by the corpus luteum. Ovarian function on the other hand is conditioned by the gonad-stimulating fraction of the anterior pituitary lobe. Two factors known as P_1 and P_2 determine this action; they are oestrogenic and kyogenic respectively. It is theoretically possible to utilize these P factors in certain clinical conditions in which stimulation of ovarian secretion is indicated. The writers then briefly indicate the clinical applications of this work in the treatment of certain conditions in the human being.

II. In the second paper the writer criticizes the use of P factors in human clinical practice. Their precise action is not clearly understood; they are extraordinarily potent and, in the lower animals at least, their use may profoundly affect ovarian function. It is not known whether the ovarian changes induced are permanent.—G. B. Brook.

Rossi, P. (1933). Traitement de la septicémie des veaux et des entérites du jeune âge, par l'ergostérol irradié. [**Treatment of Septicaemia in Calves**

and Enteritis in Young Animals by Irradiated Ergosterol].—*Rev. Path. comp.* **33.** 7-30. 2 tables. [81 refs.]

Irradiated ergosterol is stated to be of great value in the prevention and treatment of white scour in calves and diarrhoea of young pigs, rapid recoveries from disease and improved general health being obtained. It is recommended to treat all calves and pigs from the day of birth and to continue daily for six to eight days. If any animal becomes affected, treatment should be continued until recovery is established. For calves, up to 12,000 to 15,000 rat units may be given daily to each animal. In the treatment of young pigs, the sow is fed with 2,500 to 5,000 rat units daily.

Details are given of the results obtained in the treatment of 12 outbreaks in pigs and 40 in calves. The few failures met with are attributed to too small dosage, administration for too short a time, administration in water instead of in whole milk, use of unstandardized product and possible ergosterol-resistant micro-organisms.

The results obtained appear to indicate that irradiated ergosterol has anti-infection properties (vitamin A) as well as its recognized anti-rachitic properties (vitamin D).—A. Brownlee.

Veraart, B. A. G., & Drenth, Y. B. (1932). De antiseptische Kracht (in vitro) van 5 pCt. Tinctura Jodii vergeleken met die van vele andere Antiseptica. [**The Antiseptic Power of 5 per cent. Tincture of Iodine compared with that of Many Other Antiseptics**].—*Ned. Tijdschr. Geneesk.* **76.** 4096-4116. 1 plate, 4 tables. [5 refs.] [Summaries in French and German : abst. from orig.]

From these *in vitro* tests it appears that, as in other tests made *in vivo*, the antiseptic power of 5 per cent. tincture of iodine is so great that this remedy must be regarded as one of the most powerful antiseptics. Spore-forming bacteria are destroyed within a very short time (up to 30 minutes) in an albuminous medium. Only strong antiseptics of this type should be considered in the treatment of wounds caused by accidents. They may be called abortive wound-antiseptics. Five and 10 per cent. tincture of iodine and 1 per thousand rivanol can be considered as abortive wound-antiseptics. Five per cent. carbolic acid solution can certainly not come into this category.

As albumins are antagonistic to bacteria in combination with iodine, 5 per cent. of the tincture in excess must be applied to the wounds which should have been properly cleansed and should be well dried afterwards.

Spores of tetanus are more resistant to antiseptics than anthrax spores. *Bact. coli* appeared more resistant than staphylococci ; *Staphylococcus aureus* seemed to have a greater resistance than *S. albus*.

—B. J. C. te Hennepe (Rotterdam).

Chandler, W. L. (1933). **Some Observations on Chlorin as a Disinfectant.**—*J. Amer. Vet. Med. Ass.* **82.** 95-99. [6 refs.]

The author discusses earlier work showing that exposure to very high concentrations of hypochlorite solutions for several days is required to destroy coccidial oocysts and then shows that, if moderately strong solutions are made sufficiently acid, destruction may be accomplished very rapidly, provided the amount of faecal matter is not so high as to use up the " available chlorine." He found that 0·1 c.c. of finely divided centrifuged faecal matter, in presence of 10 c.c. of hypochlorite solution containing 0·1 per cent. of available chlorine and 1·0 per cent. of hydrochloric acid, was completely sterilized in ten minutes. If, however,

acid was used in amount insufficient to convert hypochlorous acid into free chlorine the sporulation of the oocysts was stimulated. He therefore considers that destruction is dependent upon direct chlorination (not upon oxidation).

He points out that, although the practical application of these observations to the disinfection of poultry houses remains to be investigated, freshly acidulated hypochlorite solutions containing 0·2 per cent. of " available chlorine " should be effective in destroying oocysts if applied at the rate of three gallons per 100 square feet of surface and agitated with a broom, but that mere spraying with indefinite solutions of hypochlorite might do more harm than good by stimulating sporulation. A word of caution on the irritant properties of volatilizing chlorine is given and a gas mask advised.—H. H. Green.

POISONS AND POISONING.

Skidmore, L. V. (1933). **Water Hemlock (Cicuta maculata L.) Poisoning in Swine.**—*Vet. J.* **89.** 76-80. 1 fig. [14 refs.]

A pig weighing 185 lb. ate 500 g. of the green tops of this plant without ill effects, but died within one hour and 35 minutes of eating 275 g. of the ground fresh roots. The symptoms were nervous, illustrated by restlessness, trembling, convulsions and paralysis. The animal made only slight attempts of retching and vomiting.

In the cases of two other pigs there was recovery and after a further feed of the root the symptoms were less pronounced.

The poisoning is probably due to cicutoxine.—G. D. Lander.

Linton, R. G., & Wilson, A. N. (1933). **Poisoning of Pigs by Sodium Bicarbonate in Flour Sweepings.**—*Vet. J.* **89.** 80-82. 2 tables.

The use of flour sweepings, which eventually were found to contain 33·7 per cent. of sodium bicarbonate, when fed in ordinary rations, caused illness in suckling sows marked by inappetence and thirst, the animals standing with heads lowered, oblivious of their surroundings, staggering on the forelegs and squealing when forced to move. All recovered after free exhibition of milk, except one sow which was slaughtered in a moribund state, and showed as the only lesion an inflammatory patch of peculiar charred appearance on the stomach wall, which at this part was oedematous and thickened. The litters remained healthy.

—G. D. Lander.

Perkowski, H. (1932). O dzia aniu trucizn na komórki wolnozyjace. [**On the Action of Poisons on the Free-Living Cells**].—*Wiadom. Wet.* **14.** 497-536. 30 tables. [80 refs.] [Summary in French : abst. from orig.]

The author describes the results of his researches into the effects of various metallic salts, alkaloids, glucocides, etc., on various free-living cells, particularly on the infusoria (*Paramecium caudatum*, *Stylonychia pustulata*), and on human and rat spermatozoa.—K. Szczudlowski (Lwow).

PHYSIOLOGY.

I. Dawbarn, Mary C., & Farr, F. C. (1932). **Variations in the Dry Weight and Iodine Content of the Thyroid Glands of Sheep under Uniform and Varying Conditions.**—*Austral. J. Exp. Biol. & Med. Sci.* **10.** 119-142. 8 tables, 6 diagrams. [25 refs.]

II. Marston, H. R., & Peirce, A. W. (1932). **The Effects Following Thyroidectomy in Merino Sheep.**—*Ibid.* 203-213. 3 figs., 5 tables, 3 charts. [14 refs.]

I. A statistical survey of the dry weight and total iodine content of the thyroid glands of 700 sheep. There is no evidence of iodine deficiency in the animals from districts so far covered. There was a general, though not complete, correlation between the dry weight of the gland and the iodine content. It is suggested that enlargement of the gland is due to colloid storage rather than to hyperplasia. Conditions of drought gave a slight increase in the mean dry weight of the glands and more than doubled the percentage of iodine. There were no significant differences due to sex. For the first three years the weight of the thyroid increases, but from nine months onwards the percentage of iodine does not change. The administration of iodine, up to 1 mg. per day, in the form of licks, for four months had no correlated effect upon the size or the iodine content of the glands.

II. Thyroidectomy at one year gives very little difference on growth rate. When performed at six to eleven weeks the mean growth rate is reduced, but there are wide individual variations. One month after operation the standard metabolic rate is –4 to –43 per cent. of controls. A year later, operated and control animals are very similar to each other. The rate of growth and the greasiness of the wool are reduced by thyroidectomy. No myxoedema occurred. Autopsy revealed regeneration in many cases and the differences between the operated sheep (and also the records of previous workers), could be accounted for by the degree of regeneration which had occurred.—Henry Dryerre.

Robinson, M. H. B., & Thompson, J. H. (1932). **An Anti-Growth Principle derived from the Parathyroid Gland.**—*J. Physiol.* **76.** 303-314. 10 figs., 1 table. [5 refs.]

A number of extracts and preparations from ox parathyroid glands have been made and the effect of their subcutaneous injection daily over a period of months into rabbits and rats noted. Most of the animals treated showed marked retardation of growth, whilst no other symptoms of disturbance, not even those associated with derangement of calcium metabolism, were exhibited. It is concluded that the parathyroid contains an anti-growth factor.—W. R. Wooldridge.

Cheymol, J., & Quinquaud, A. (1932). L'ablation de la rate ne fait pas varier le taux de calcium du sang chez le chien. [**Removal of the Spleen does not lead to any Change in the Blood Calcium of the Dog**].—*Le Sang.* **6.** 822-823. 1 table. [1 ref.]

Three animals were examined. Blood calcium was estimated three or four times before removal of the spleen and again from the 10th to the 77th day after the operation. No significant difference was noted.—W. R. Wooldridge.

MacOwan, Marion M. (1932). **Observations on the Ductless Glands, the Serum Calcium, and Egg Laying in the Fowl.**—*Quart. J. Exp. Physiol.* **21.** 383-392. 3 figs., 5 tables. [9 refs.]

A good laying hen produces on an average 200 eggs per annum, each containing about 2·5 g. of calcium oxide. A large number of white leghorn hens were killed at different times throughout the year and the blood calcium value determined. The pituitary, thymus, adrenal, thyroid and parathyroid glands were examined histologically and any changes compared with the weight of the largest egg in the oviduct. As the first ovum develops in the ovary, the blood-calcium rises rapidly,

reaching a maximum level with an average of 10 to 30 mg. per 100 c.c. The blood calcium then falls relatively slightly for egg weight above 30 g. until the egg is laid, when these changes begin again. Associated with these egg weight changes there are distinct histological changes in the parathyroid, but not in the other glands examined. Injection of parathormone raises the blood calcium of pullets, but has no effect during moulting or on the blood calcium of cocks. Owing to the somewhat rapid variation in the blood calcium value of hens, these were not tested with parathormone.

A supply of calcium in the diet sufficient only for maintenance does not permit of egg-laying.—W. R. Wooldridge.

Dry, F. W. (1933). **Hairy Fibres of the Romney Sheep. II. Sickle Fibres.**—*New Zealand J. Agric.* **46.** 141-153. 9 figs.

In his second article on hairy fibres the author describes sickle fibres of the new-born lamb with their post-natal life. Sickle fibres range from a " super " size to a " baby " size. Many of the sickle fibres become chalky and can be seen with the naked eye. When the fibres are shed there is a tendency for the follicles to produce hairy types of growth to succeed the sickle fibres.

It has been noted that lambs free from halo hairs on the back tend to be free from sickle fibres, so that rigid culling by means of halo hairs tends to avoid the blemish in the fleece of chalky sickle fibres.—C. S. M. Hopkirk.

Lemberg, R., & Barcroft, J. (1932). **Uteroverdin, the Green Pigment of the Dog's Placenta.**—*Proc. Roy. Soc. London. Ser. B.* **110.** 362-372. 2 figs. [27 refs.]

The authors give the name of uteroverdin to the green pigment present in the dog's placenta. It is formed as two green rings on the uterine wall at the attachment of the ovum, first appearing about the 21st day of pregnancy and increasing until they cover together about two-fifths of the whole placenta. The pigment is also found with other products of blood degeneration in the cells of the ectoderm foetal villi. Previous investigators all agree that the pigment is derived from the haemoglobin of maternal blood extravasated from the haemorrhages under the chorion. The authors state that it is not clear whether the pigment is formed in the ectoderm cells or is only taken up by these phagocytic cells after its extracellular formation in the extravasate. They point out that the real interest is whether the iron set free from extravasated haemoglobin is a provision for the nutrition of the foetus. They isolated from each of three cases pigment equivalent to about 2·75 g. of haemoglobin and they consider that the uterus contained uteroverdin corresponding to at least 3 to 4 g. of haemoglobin. Green pigments are found in such prominence only in the dog's uterus and in the egg-shells of birds, occurring in less degree in the uterus of other species. The chemical nature of the pigment was investigated for the purpose of showing the relation between it and bilirubin ; the method adopted for its isolation is given in detail.

—R. G. Linton.

Schultz, W. H. (1933). De Algemeene Functies van het Bindweefsel en de Niet-Specifieke Therapie. [**The General Functions of Connective Tissue and Non-Specific Therapy**].—*Tijdschr. Diergeneesk.* **60.** 57-66 and 134-144. [Summaries in English, French and German : abst. from orig.]

The author discusses the functions of connective tissue in general and those of the " reticulo-endothelial system " and their connection with " non-specific therapy."—B. J. C. te Hennepe (Rotterdam).

TECHNIQUE.

RUBINSTEIN, M. (1932). Note sur l'évolution du *p*H dans les milieux de culture de tissus. [**A Note on the Changes in pH in Media during the Cultivation of Tissue**].—*C. R. Soc. Biol. Paris.* **111.** 58-60. [3 refs.]

The tissues used were embryonic fowl, embryonic rat, adeno-carcinoma of the mouse and leucocytes. In each group of tissue culture the pH was practically the same immediately after sowing. After 24 hours incubation, a marked lowering of pH was noted which seemed to depend upon the rapidity of growth of the tissue and possibly also upon the nature of the material itself. Later the pH reached a point at which it remained constant except for slight rises and falls. A rise in pH occurred in contaminated and old cultures.—H. G. LAMONT.

EDWARDS, S. J. (1933). **A Differential Plating Medium for Streptococcus Mastitis.**—*Proc. Roy. Soc. Med. London.* **26.** 204-205. [1 ref.]

The addition of crystal violet in a concentration of 1 : 200,000 to blood agar completely inhibits the growth of nearly all the staphylococcus and *B. subtilis* organisms commonly found present in milk samples. A few organisms such as *Bact. coli*, *Str. lactis* and one variety of staphylococcus are dye-resistant, but they can be distinguished from mastitis streptococci by the change which they produce in the medium when aesculin and an iron salt have been added. In the presence of aesculin and ferric citrate, each in a concentration of 0·05 per cent., the contaminating organisms give rise to black colonies or colonies surrounded by a dark brown zone.—S. J. EDWARDS.

CHURCHMAN, J. W., & EMELIANOFF, N. V. (1933). **A Study of the Bacterial Capsule by New Methods.**—*J. Exp. Med.* **57.** 485-510. 1 text fig., 3 plates. [30 refs.]

By means of a new method of staining capsules, the authors have demonstrated their presence on a number of supposedly non-capsulated organisms and have shown that flagella have no connection with the bacterial body, but are attached only to the capsule.

Cultures of not more than 18 hours on solid media are used. Films of aqueous suspensions are made and are air-dried. Ten drops of freshly filtered Wright's stain are applied and allowed to evaporate nearly, but not quite, to dryness, this taking about three minutes. The stain is washed off rapidly with Clark and Lubs' buffer pH 6·4 to 6·5 and the film is dried immediately with a fan.

Capsules retain the stain only when every factor in the process is favourable ; the correct exposure to the stain, amount of washing, age of culture, pH of environment and chemical constitution of the suspending fluid.

The organisms studied included those universally regarded as devoid of capsules e.g. *Bact. coli*, those which are non-capsulated in culture, e.g. *B. anthracis* and those which have only on rare occasions exhibited capsules and then only when in special environment, e.g. *B. subtilis*.

The authors point out that the expectation of constant staining behaviour on the part of capsules is no more justified than it would be in the case of bacterial somata, some of which are Gram-positive, some acid-fast, and so on, but capsules have this in common as a staining characteristic that they usually remain unstained by dyes which stain somata readily, unless a mordant or special method of fixation is used.

The authors discuss their findings in a convincing manner and consider that they justify a re-examination of the problems raised.—S. H. GAIGER.

Boddie, G. F. (1932). **Urine Analysis as an Aid to Diagnosis.**—*Vet. Rec.* **12.** 1427-1430.

A description of a few cases of sick dogs where urine analysis was found to be of service as an aid to diagnosis. The cases considered included chronic interstitial nephritis, alimentary toxaemia, cystitis and jaundice of haematogeneous origin. The significance of albumen in the urine is discussed. Albumen may be present in the urine in young convalescent animals. Sugar has not yet been found in the urine, but occasionally spurious reactions (Fehling's solution being reduced) have been noted.—W. R. Wooldridge.

MISCELLANEOUS.

Klarenbeek, A., Veenendaal, H., & Voet, J. (1933). Verslag van eenige Pharmacologische en Klinische Onderzoekingen in het afgeloopen Cursusjaar. [**Report of Some Pharmacological and Clinical Researches during the Course of the Past Year**].—*Tijdschr. Diergeneesk.* **60.** 72-82. [8 refs.] [Abst. from orig.]

(1) Triorthocresylphosphate.—Extensive research has been carried out on the effect of triorthocresylphosphate on different species of animals.

Reports of poisoning by this drug in human beings in America and Holland have been published, polyneuritis being a prominent symptom.

(2) Canine Leptospirosis.—The results of extensive research on this disease will shortly be published.

(3) Vitamin Requirements of Chickens.—Work on this subject, including X-ray photography, is still continuing.

(4) Fowl Pox.—The pharmacology of hexamethylenetetramine and formalin intramuscularly, of naganol intravenously and stovarsol *per os* on fowls suffering from fowl pox was studied. The agents tested were not of much value.

(5) Blockage of the Reticulo-Endothelium.—The action of sterile Indian ink injected intravenously into rabbits was studied, but the work is still incomplete.

(6) Canine Hysteria.—The connection of this condition with dietetic factors was studied. Certain kinds of dog biscuits appeared to cause the disease.

(7) Avertin.—This narcotic was tested on the cat, dog, chicken, rabbit, guinea pig and rat. The only animal of this series on which it was of value was the cat.

(8) Thallium Acetate.—Tests were made on dogs suffering from demodectic mange to ascertain if the use of thallium acetate as a depilatory agent would have curative value, but with negative results.

Notes on poisoning by thallium are given. This applies in addition to rabbits and fowls.

(9) Lead Poisoning.—A method of diagnosis by the use of X-ray was investigated and still continues.

(10) "Pernocton."—This narcotic was tested on dogs, cats, rabbits and guinea pigs. The results obtained were not very favourable.

This report originated from the Institute for Veterinary Pharmacology, Clinic for Small Animals, Utrecht University.—B. J. C. te Hennepe (Rotterdam).

—. (1932). **Licensed Meat-Export Works in New Zealand, Season 1931-32.**—*New Zealand J. Agric.* **44.** 73.

—. (1932). **Live-Stock in New Zealand, 1931.**—*Ibid.* 76.

A full list of the licensed meat export works for the season 1931 to 1932 is

given, which shows a total of 37 with killing capacities varying from 25 to 250 cattle and 500 to 10,000 sheep per day or a combined total of 3,640 cattle and 149,100 sheep daily. The storage capacity in 60 lb. carcasses is 5,582,549. One of the works is at present not operating, having been disorganized by the earthquake and fire in 1931. Another works is not operating.

In 32 of the works both cattle and sheep are killed.

The livestock in the two islands at 31st January, 1932 was:—horses—295,743; cattle, including dairy cows—4,080,525; sheep—27,574,289; lambs—14,528,309 and pigs—476,194.—T. Dunlop Young.

I. van Drimmelen, G. C., & Thiel, A. R. (1932). **Anatomical Studies No. 28: Hypospodias in a Merino Ram.**—*18th Rep. Direct. Vet. Serv. & Anim. Indust. Union of S. Africa.* Part II. pp. 1063-1066. 4 figs.

II. Curson, H. H. (1932). **Anatomical Studies No. 30: On Two Cases of Atresia Ani.**—*Ibid.* pp. 1073-1076. 5 figs. [2 refs.]

III. Curson, H. H. (1932). **Anatomical Studies No. 31: On Two Cases of Acardiacus.**—*Ibid.* pp. 1077-1079. 3 figs.

IV. Malherbe, W. D. (1932). **Anatomical Studies No. 32: Atresia Ani with Rectum Opening in Vagina in a Kitten.**—*Ibid.* pp. 1081-1082. 1 fig. [1 ref.]

V. Wheeler, W. J. (1932). **Anatomical Studies No. 33: Micrognathy in a Lamb.**—*Ibid.* pp. 1083-1084. 2 figs.

VI. Maré, G. S. (1932). **Anatomical Studies No. 34: Faulty Jaws in Sheep.**—*Ibid.* pp. 1085-1086. 1 fig. [1 ref.]

VII. Curson, H. H. (1932). **Anatomical Studies No. 36: On Two Anomalies of the Cervix Uteri in a Merino Sheep.**—*Ibid.* pp. 1091-1092. 1 fig. [1 ref.]

I. The scrotum was divided into two distinct sacs. The urethra ended below the anus in a vulva-like opening. The urethral process was present, but blind. There was no corpus cavernosum urethrae. Spermatozoa were present in the right testicle but not in the left, the latter being partially atrophied.

II. The first case was a heifer about one year old. Faeces were discharged through the vagina. The other case was that of a day-old bull calf. The only opening was one into the urethra. The animal had no tail.

III. In the first case the foetuses were removed from the uterus of a goat. One of them had developed normally and was approximately five months old. The anomaly lacked a hairy covering and was about half the weight of the other. The nasal region was deformed and only one eye was present. The second case was from a Friesland cow and was removed along with a full time normal bull calf. It was an amorphous fleshy mass covered with hair showing the Friesland marking.

IV. The kitten, which was six weeks old when killed, passed small quantities of semi-fluid faeces and appeared to be in constant distress. It drank a normal amount of milk. At *post-mortem* examination it was found that the rectum was greatly distended and discharge was through the vagina.

V. Only the two vertical parts of the rami of the mandible, connected with a plate of bone, were present. This structure articulated normally with the temporal bones. The pharynx and larynx were rudimentary. The tongue was absent.

VI. An eleven-months-old Suffolk-Blackhead Persian lamb with parrot mouth was found to weigh 37 lb., while a normal lamb born at the same time weighed 85 lb. The lower jaw was $\frac{3}{4}$ inch short and slightly misplaced. The teeth had cut into the hard palate.

VII. The os uteri was covered with a strong fibrous fold arising from the

floor of the vagina. The mucous folds in the cervical canal actually formed a partition across the lumen.—GEORGE SLAVIN.

OFFICIAL AND OTHER REPORTS.

DIMOCK, W. W., TRAUM, J., DIKMANS, G., BROERMAN, A., GRAHAM, R., & RICHARDSON, A. G. G. (1932). **Report of Special Committee on the Prevention of Transmissible Diseases of Animals.**—*J. Amer. Vet. Med. Ass.* **81.** 504-512.

Short summaries are given under the following headings :—Transmissible Diseases of Poultry—infectious laryngotracheitis (due to a filtrable virus), fowl cholera, leucaemia and psittacosis ; Transmissible Diseases of Swine—swine erysipelas ; Parasites and Parasitic Diseases—anaplasmosis, liver flukes in sheep and cattle, tapeworms of sheep, parasites of swine, parasites of horses, treatment of parasitic diseases ; and Transmissible Diseases of Dogs.

—A. W. STABLEFORTH.

—. (1933). **Report of Committee on Miscellaneous Transmissible Diseases.**—*J. Amer. Vet. Med. Ass.* **82.** 388-391.

During 1932 encephalomyelitis of equines spread rapidly and the disease has now been reported as far south as Texas and to the east in South Dakota. There was no evidence to account for this rapid spread of the infection, but reports pointed to it being carried by apparently normal horses. The actual mechanism of natural contagion from horse to horse has not been demonstrated. It is significant that the period of greatest prevalence coincides with that of the tabanids and other biting insects which attack horses.

There is considerable evidence that one attack of the disease confers immunity. It has been proved that a highly potent antiserum can be readily and consistently produced by the hyperimmunization of horses. Encouraging results are claimed from the use of this serum as a therapeutic agent, but as a prophylactic agent it has given disappointing results.

The Committee points out that the continued and rapid spread of this disease with its potentiality of enormous damage, especially in areas of dense horse population, shows the need for its intensive study.

An outbreak of foot and mouth disease occurred during the year under review in California. The infection was confined to swine and attempts to transmit the infection by inoculation to cattle and guinea pigs were unsuccessful.

Outbreaks of vesicular stomatitis occurred in a number of states. In many of the herds only a few animals exhibited symptoms, but in one or two herds there was a morbidity of about 40 per cent.

Inoculation tests undertaken by the federal Bureau of Animal Industry have proved the existence of two types of the disease. The horse is immune to foot and mouth disease and highly susceptible to vesicular stomatitis.

Research studies on anaplasmosis were carried out during the year. Eight cows were infected with the disease from the bites of four different species of horse flies and four of these animals died.

Although it is generally claimed that infected animals remain " carriers " throughout life, in one known infected cow the carrier state had apparently disappeared at the end of four years.—T. M. DOYLE.

—. (1932). 92 Versammlung der Gesellschaft Deutscher Naturforscher und Aerzte. [**92nd Meeting of the Association of German Biologists and Doctors.—Summary of the Veterinary Sections.**]—*Tierärztl. Rdsch.* **39.** 739-741, 755-757, 772-773, 788-791 and 804-807.

ZWICK.—BORNA DISEASE. A cinematograph film of Borna disease was shown and it was stated that this virus disease is transmissible to the rabbit, guinea pig, rat, fowl, sheep, bovine and horse. The virus is nearly related to that of malignant bovine catarrh and it is excreted in the nasal secretion, saliva and urine of affected animals. The histological changes in the brain in Borna disease are similar to those of human epidemic encephalitis, Heine-Medin disease and rabies. There is a good protective inoculation method against the disease.

GÖTZE.—MALIGNANT BOVINE CATARRH. The author here confirms his earlier observations [see this *Bulletin.* **1.** 90]. The exact nature of the cause is not yet clear : if a virus, it is a large particle one, as it is removed by filtration. Practically all orthodox experiments to elucidate the cause and mode of infection have given negative results : it has, however, been observed that in practically all outbreaks, contact with sheep has occurred and that their removal leads to the disappearance of the disease.

[This article, largely a review of data reported previously (see this *Bulletin.* **1.** 89.) was published in full—" Bösartiges Katarrhalfieber. IV. Mitt."—*Berl. tierärztl. Wschr.* **48.** 849].

OPPERMANN.—EPIDEMIOLOGY AND THERAPY OF BORNA DISEASE. The incidence of Borna disease in horses appears to have a connection with soil moisture. Urotropin was found useful in the prodromal stage.

ZIEGLER.—BORNA DISEASE, MALIGNANT BOVINE CATARRH AND SHEEP ENCEPHALITIS IN SAXONY. The epidemiology of these diseases in Saxony is discussed. In recent years the incidence of the first two has shown similarities, though no actual connection between them has been demonstrated. Sheep encephalitis has only been observed in the Leipzig district.

DEGLER, a worker on " dowsing," [" divining "] spoke on the influence of certain electro-negative short-wave earth radiations on disease. These are alleged to occur particularly at isolated spots of the earth's surface, and human beings and animals living exactly over them are said to be liable to disease. One human case of anaemia and several cases of Borna disease are referred to in support of the theory.

KÜST.—DIAGNOSIS OF PREGNANCY IN THE MARE BY THE DEMONSTRATION OF HORMONE IN THE BLOOD. The demonstration of ovarian hormone in the blood of pregnant mares has been found very reliable for diagnosis from about the 40th day after conception. The use of blood is preferred to the former urine test ; it gives fewer errors and uncontaminated samples of blood are easier to obtain than pure samples of urine, a factor of great importance in the biological tests.

KOCH.—HORMONAL INCREASE OF FERTILITY. AIMS AND METHODS. The author discusses the possible application of hypophyseal and other hormones in order to obtain extra pregnancies in certain animals normally breeding infrequently [a policy that is not without an element of danger as it might lead to a further increase in breeding diseases].

In the discussion HUPKA and KÜST reported success with the use of " prolan " [anterior hypophyseal hormone preparation] in selected cases of ovarian subfunction in cattle.

HUPKA.—TREATMENT OF MILK FEVER WITH CALCIUM. The treatment of 84 cases of milk fever by chemotherapy alone is recorded : calcium chloride (intravenously) with or without magnesium chloride, calcium glycerophosphate

and calcium gluconate (intravenously or subcutaneously) were employed. The author prefers the injection of calcium and magnesium chloride into the external mammary vein to other drugs and other ways of administration. Apart from advice not to exceed a dose of 40 g. of calcium chloride in a 1 : 10 solution, no more is said about dosage.

Seven cases of acetonaemia and some cases of inability to rise (" Festliegen ") were also treated with success by calcium. HUPKA considers both conditions closely related to milk fever aetiologically.

GÖTZE.—MATERNITY AND LACTATION TETANY IN MARES, COWS AND SOWS. Tetany may occur in mares at the parturition period, during the suckling period and also as a result of rail travel [" transit fever "]. The condition is similar in each case but does not resemble human eclampsia. As treatment, calcium salts intravenously and chloral hydrate are indicated. Grass or lactation tetany in cows is now well known. It can be prevented by attention to diet. Lactating cows should be changed over gradually from dry food to fresh pasture. Treatment is on the same lines as for milk fever. An " alimentary stall tetany " in cows, caused by overfeeding of high protein concentrates, is also described. It occurs around the period of parturition and the onset is usually gradual, initial tetanic symptoms being followed by paraplegia or paralysis. Full details of the blood constituents in this disease are not yet available. DETREZ reports a constant increase in guanidine in the blood. Prophylaxis is by dietetic means and treatment by calcium-magnesium combinations.

Parturient sows are also liable to a condition of tetany, similar in nature to milk fever and similar treatment is indicated (8 to 10 g. calcium chloride + 3 to 4 g. magnesium chloride per 100 kg. body weight).

All these conditions are well described by the author.

KÜST.—TREATMENT OF THE DISEASED UTERUS IN CATTLE. [As the full lecture was published separately, it has been abstracted separately ; see this *Bulletin.* **3.** 558].

OPPERMANN.—HAEMATOLOGICAL DIAGNOSIS OF EQUINE INFECTIOUS ANAEMIA. The various methods of examining the blood for the diagnosis of equine infectious anaemia are reviewed. Fulton's sublimate test is preferred : it is a test for the estimation of the albumin-globulin ratio. [In Sweden, WALL bases diagnosis on the estimation of the iron content of citrated blood].

PABST.—PARALLELISM BETWEEN PULSE RATE AND TEMPERATURE. As a result of many years of research the author has compiled a table showing the average normal pulse rate for body temperatures between 38° and 40°C., such as occur in the common domestic animals. The figures for each 0·2°C. of temperature are given : the pulse rates range from 40 (38°C.), 60 (39°C.), 80 (39·5°C.) to 100 (40°C.).

STANG.—EFFECT OF VARIOUS KINDS OF DE-FATTED SOYA PULP ON THE BLOOD PICTURE OF CATTLE. The so-called " Dürener disease " of cattle has been definitely proved to be caused by the feeding to cattle of soya pulp previously de-fatted by trichlorethylene, which on technical grounds is preferred by the manufacturers of soya bean oil. It was found experimentally that the blood picture of cattle so fed becomes discernably pathological one or two months after the inclusion of the soya pulp in the ration. It does not return to normal until about five months after discontinuation of the practice. The blood change is a severe leucopenia, particularly involving the neutrophils. The use of other agents to extract the fat from the beans effectively prevents the disease : the pathogenesis of " Dürener disease " is unknown.

WIRTH.—STUDIES ON SPECIFIC REACTIONS OF THE HAEMOPOIETIC ORGANS OF DIFFERENT ANIMALS. The author, in studying the blood pictures of pathological anaemias in animals, observed a lack of normoblasts in the horse and abundance of such cells in the dog. The blood picture of horses and dogs, drained of about half their total blood, was studied experimentally : the equine blood picture subsequently showed a conspicuous absence of immature cell forms, whilst, in canine blood, normoblasts, polychromatic and haemoglobin-containing erythroblasts and Jolly bodies were very numerous. This and other observations have shown how different is the physiology of haemoporesis in the different animals.

A few members commented on the subject.

SCHERMER.—NEW INFORMATION ON BLOOD GROUPS IN THE DOMESTIC ANIMALS. [As the full lecture was published separately, this paper will appear in the next issue].

SZIDAT.—ON THE DEVELOPMENT AND MODE OF INFECTION OF *Tracheophilus sisowi* Skrj. etc. [As the full lecture was published separately, it has been abstracted separately—see this *Bulletin*. **3.** 548].

WITTE.—ON THE PRESERVATION OF COMPLEMENT IN HYPERTONIC SALT SOLUTIONS. The work of the author and of others on the preservation of complement by the addition of various salts is reviewed. Various solutions of salts are effective in conserving the properties of complement ; in addition to sodium chloride the following were used :—a solution consisting of 14 per cent. sodium acetate and 4 per cent. boric acid in distilled water to be added to an equal quantity of complement ; and also 5 to 10 per cent. solutions of potassium acetate, potassium sulphate, potassium chloride, secondary potassium or sodium phosphate or magnesium sulphate, in each case mixed with an equal volume of complement.

KOK.—ELECTRICAL KILLING AND NARCOSIS. The principles of electrical narcosis are outlined and the author's experiments on dogs described. For this purpose an alternating current of about 0·2 amp. and a periodicity of 50 was employed successfully in procuring narcosis. An interrupted direct current causes a similar narcotic state.

KOCH.—SHAPE AND FUNCTION OF RUDIMENTARY SKELETAL PARTS IN UNGULATES. The rudimentary bony parts of the bovine skeleton are referred to from the zoological and genetical viewpoints.—J. E.

BOOK REVIEWS.

FONTES, A. [Professeur à l'Institut Oswaldo-Cruz. (Rio de Janeiro)]. (1932). L'Ultravirus tuberculeux. [**The Ultravirus of Tuberculosis**]. pp. 108. 2 figs., 5 plates, 2 tables. [15 pages of refs.] Paris : Masson et Cie. [8vo.] [Fr.28].

This book is mainly a synopsis of research work carried out between 1906 and 1930 at the Oswaldo Cruz Institute, Rio de Janeiro, and the author's interpretation of his findings. It is divided into six chapters dealing with various aspects of the subject. The first deals with the presence of a lipolytic agent in tuberculous pus as a cause of the disintegration of the organisms, the filtrability of the virus and the regeneration of acid-fast organisms *in vivo* without the formation of tuberculous lesions, the relationship between the morphological variants and virulence, tuberculous infection without either the presence of bacillary forms or characteristic lesions and saprophytism of the tuberculous virus.

Chapter II discusses the pathogenicity of the filtrable virus, attenuation and regeneration of virulence and immunity reactions.

Chapter III deals with atypical tuberculous infection, the presence of the ultravirus in different pathological materials and latent and occult tuberculosis.

The remaining chapters deal with hereditary infection, predisposition and immunity, lysis and granule formation amongst bacteria, the specificity and non-specificity of antigens and the possibility of finding a laboratory method of diagnosing the disease in the incubation stage.

The book as a whole is devoted to an account of what the author believes to be the life cycle of the tubercle bacillus and a study of the pathogenesis of tuberculosis.—S. H. GAIGER.

RICHARDS, A. [Professor of Zoology, University of Oklahoma]. (1931). **Outline of Comparative Embryology.** pp. xvi+444. 224 figs., 7 tables. [23 pages of refs.] New York : J. Wiley & Sons, Inc. London : Chapman & Hall, Ltd. [31s.]

An excellent book dealing with the development of the individual up to organogenesis or the formation of organs. It is essentially a work for specialists, but nevertheless contains much that is illuminating and will prove of interest to veterinarians. The subject is treated in a wide manner, covering all the animal kingdom. In Part I, after a short historical introduction, the following are the main subheadings of the subject matter :—the germ cell cycle, egg types, the various types of cleavage, blastulae, endoderm and mesoderm formation, type of invertebrate larvae, the formation of the mammalian embryo and embryonic membranes.

A second part deals with various embryological problems. This latter part is more of a critical review of certain theories and general problems of embryology, such as the germ layer theory, recapitulation, asexual and parthenogenetic reproduction, paedogenesis and neoteny, polyembryony, the determination problem and ecological control of invertebrate larval types. The book is well illustrated, but it might have been an advantage to refer more frequently in the text to the appropriate figure or part thereof that is being described. A glossary of technical terms is appended together with an excellent bibliography. The book is a refreshing corrective to the usual zoological teaching of types, the amazing diversity of all the stages of development being clearly described.—W. R. WOOLDRIDGE.

MARTIN, C. R. A. [M.R.S.I., A.M.I.S.E., Senior Sanitary Inspector, Whitstable]. (1932-1933). **Practical Food Inspection. Vol. 1. Meat Inspection. Vol. 2. Fish, Poultry and Other Foods.** pp. 312 and vii+249. 195 figs., 1 plate, 10 tables. London : H. K. Lewis & Co., Ltd. [8vo.] [15s. and 10s. 6d.]

The author states that the book is written by a practical inspector and that he has omitted much ultra-scientific detail, but he produces a book full of scientific details and does not give the source from which he obtained his information. There are many errors showing a lack of scientific training, even in the glossary of terms which he adds to the end of volume 2 and in the letterpress the *Bact. aertrycke* is mis-spelt and written as " aerotrycke."

The book cannot be recommended as one to which medical or veterinary officers may turn for guidance, but, with errors corrected, the work, especially the second volume, should prove very useful to sanitary inspectors who perform, as part of their duties, the work of meat inspection.—T. DUNLOP YOUNG.